THE METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD, COPPER AND BRASS, THE BRASS FOUNDER AND FINISHER AND
ELECTRO-PLATERS REVIEW

OLD SERIES. Vol. 21. No. 2. | NEW YORK, FEBRUARY, 1915. | NEW SERIES. Vol. 13. No. 2.

BRONZE IN HISTORY-MAKING

How Bronze Makes History. An Ancient Figured Bronze Door Interestingly Reveals the Aerial-Navigation Engineering of Antiquity. The Dirigible of Ancient Warfare: Its Life-Story Told in Bronze.

By L. Lodian.*

First Airship—It is interesting in this connection to note that an operative and practicable flying-machine was made by Archytas, a Greek, about 400 years before the birth of Christ. It was in the form of a "flying dove"; and was formed of wood, being hollow, and operated by means of compressed air.—(Woodward: "Invention", p. 14.)

FIG. 1. ILLUSTRATION FROM A DOOR WITH BRONZE PANELS ON CATHEDRAL AT VERONA, ITALY.

The only known illustration extant—to survive through the ages—that can possibly apply to the above, appears in Fig. 1—reproduced from an historic old

*Manhattan.

bronze-door. By a slight "rubbering" of the imagination, this airship or flying-machine *does* look (in the main-body part) something like a "dove," but with wings folded, as if at rest. Allowing for the atmospheric rounding-down wear of centuries of ages, the head and neck portion of the "flying dove" airship may indeed "pass muster" ornithologically—especially as coming from a crude age when bronze-working was often of a character which might be described today as "rude."

But one fact which operates in favor of our present illustration applying to the Archytas dirigible of some 2,300 years ago, is the statement that the bronze plaques among which the ancient flying-craft figures, came originally from Alexandria, where Greek influences were felt for centuries. (By a curious coincidence, the first full-size modern aeroplane is preserved today near the same region—at the Kairo museum—having been perfected by the immortal Mouillard in 1896. The types built now have scant difference.)

Our friends and readers in the British metropolis are

FIG. 2. REPRODUCTION OF A SINGLE PANEL SHOWING SUPPOSED AIR-SHIPS.

just at present "enjoying" (?) the scare of their lives in anticipation of an aerial attack from dirigibles. They have little more to fear therefrom than had the levantins of a couple of milleniums ago! True, history fails to record the use of aerial war-machines then-a-days: but we *do* read in ancient writ of "fire-balls" and "lightning-bolts" inconveniencing the belligerent armies. Whence did those missiles come? Assuredly, fire-balls no more opportunely came "out of the earth" then, nor lightning-bolts "from the blue," than they are liable to do now—much as they might be "beneficial" to the "skrap-of-paper-ists!"

So how did those aerial "votiv offerings" originate? History speaketh not! But the present paper *may!*

PROOF OF ANTIQUITY.

On the cathedral doors at Verona are a number of bronze plaques, consisting of a queer mixture of historical and mythological scenes and figures. Nobody knows for certain at what epoch these venerable doors were put up, nor the hotch-potch of bronze plaques affixed thereon. In the lapse of many centuries, as maybe one or the other plaques pitted or oxidized, or were otherwise destroyed or pried-off by pre-Yankee tourists or the light-fingered gentry, they were replaced by other bronzes, depicting anything. Thus it is that we have a bizarre mixture of Assyrian scenes, Egyptian figures, biblical legends, libels on crucifixions, oriental mystery; Hindu, Sanskrit, Nipones, etc., types; and quantities of other meaningless—to we Yanks, at least—"pictoric hieroglyphics." Some plaques have apparently never been replaced.

But a plaque that impressed me very much is in the center of the top left-hand row, Fig. 2. Nobody else ever seems to have noticed it—an oft common occurrence with things unusual. (It is known, however, to the chief of the Italian military aeronautical corps at Rome—to whom the reader can refer for more specific data which may be desired.) This particular bronze depicts a small party of Assyrian-garbed figures who are on the march, some of whom have already made a "flanking movement" to the left, and are walking up "into the sky-line," and regarding —what?

A couple of well-defined aerial craft!

* * *

The top craft is that of a boat with sail, under full headway, to judge by the deflected sail. A couple of reclining figures appear to be in the boat—reclining to lessen the wind-resistance. One of the Assyrian-garbed or semi-garbed figures is already floating in the air, but as no wings are visible, it is difficult to see how levitation is attained. (The abdomenal region is distended, however: perhaps there is sulphuretted-hydrogen gas in it!) This figure-volant is seen distinctly in conversation—almost nose to nose—with one of the Assyrians below, with raised hand, as if giving a final warning or instructions before turning to fly into the boat. Over them is an astra, and what looks like a comet.

That figure-volant is interesting, in that it is a sort of key to the raison-d'être of the air-craft in this particular bronze plaque.

Underneath the boat craft is the most important air-craft of the two. Here, in this small plaque, we see the dirigible of maybe thousands of year ago! There is no mistaking it!—a thoroughly business-like craft forcibly reminding one of the whole tribe of modern dirigibles! There is the semi-cigar-shaped taper portion of the elongated gas-bag of today; the vent (soupape) beneath for the escape of expanding gas; the suspended frame-work of car for passenger-transport (apparently an imitation in bronze of twisted ratan or wicker); and the microscope will even reveal at one end a faint suggestion of the bronze cordage suspensory-braces. The cordage lines—if they ever existed on the plaque—being the frailest and most surface-exposed part in the bronze, have long since succumbed to the "ravages of time."

At first sight, there is apparently no sign of life on the frame of the dirigible, but the glass—then even the bare eye—will detect the faintest greyish-white outline of a tiny human seated near the middle of the car-frame. One of the ugly imbecile-looking Assyrians in the sky-line is apparently seated—(on what?—on the air?)—looking at the dirigible, as if waiting for it to approach and take him (or perhaps his companions) off.

Here and there it will be noticed that a cross figures in some of the numerous plaques. These do not necessarily refer to the "incident" at Gethsemane or Calvary of a couple of milleniums ago. A Paris review lately published photographs of the crosses on monuments and sculptures of pre-Christian times—as among the Assyrians

and Nile-dwellers—showing that the cross and crucifixions in various forms were in vogue some 3,000 years ere Pontius-Pilate unwillingly "punctuated" the cross into history.

As instanced before, some of the plaques on the door have apparently been appropriated or destroyed, or have otherwise disappeared at one epoch or another, and have never been replaced. Others are possibly replicas or repetitions of plaques which were found to be "going" by the archaeologists of 500 years ago, and were redone—just as, maybe, those had been done 500 years previously. The doyen of the Italian military aeronautic corps at Rome, has it that diverse of the plaques were brought from Alexandria—in which case there is no telling their antiquity; while a local photograph words it that some are Tedeska work of the eleventh century; and, if so, it must be admited they were poorer bronze-workers than those who preceded them by a thousand years—as instance the beauty of the bronze lioness-head some 2,000 years old published in the August issue of THE METAL INDUSTRY.

* * *

Who knows? "There's nothing new under the sun." May not flying have been practiced by the ancients? Take my word for it, the lore or legends of flying which have persisted through the ages, may be founded on fact! Even in our own days, with all our wealth of illustration to remind us of the past, things are soon totally forgotten, apparently, by the human kind. Example: the "loop-the-loop" feature of a few years ago was thought a "new idea"; but *le Monde Illustré* delved into its old weekly issues of half a century ago, and reproduced the cut of a "loop-the-loop" construction erected at Havre some fifty years previously! The "Chanticleer" opera with its galina or plumed figures, was thought to be another "new idea" in histrionics, until the same publication inconveniently reproduced one of its old cuts of little over forty years ago, showing the same feature had been staged in the '60's, in another play! Now, if these things within even the memory of living man are so liable to totally lapse into oblivion, how easy for the achievements of the ancients to so lapse into oblivious desuetude, as to be thought incredible when referred to!

BRONZE IN ANCIENT INVENTION.

Many inventions considered modern, we find by discoveries at Pompeii and the Pyramids, to have been in use thousands of years ago. The forceps of the accoucher were regarded as a modern innovation—until the identical patina-incrusted bronze articles were salvaged from the débris at Pompeii! They are now in the museum at Napoli. How the world is indebted for its knowledge of the past to bronze and the old bronze-workers!

Types of costumes, of harness, of vehicles, of war implements, *et al*, are often cited and illustrated from old sculptures, bronzes, monuments, and the like. In fact, it is our chief record of the objects believed to have been in use among the ancients. Of course, it is no absolute proof that they actually used all that was depicted in bronze or sculpture: still, it is near-enough proof. May not, then, this aerial craft have also been in use?

The folding pocket-lantern is deemed a modern idea; yet I can show the reader photographs of bronze folding pocket-lanterns preserved in continental cathedrals for the past 300 years. The central-draft in lamp-illumination is also judged "modern": but specimens of central-draft Roman lamps of 2,000 years ago are available to demolish the past-century ideal. The collapsible drinking-cup in aluminum, nickeled-brass, etc., is dubbed another "Yankee notion"; but while in Nipon years ago I often used to use the Jap collapsible cup made of lathed-out bambu-rings—and they have been making them since many centuries. And it is known that the bicycle was first produced at least 250 years ago.

Many processes and secrets of manufacture in past times have been totally lost—as malleable glass; the non-oxiding ferrous metals of Indasia; while some secrets are so well kept (as Niponese bronze-lacquering; the beautiful black-brown dye of one continental family of sealskin-dyers) that with all our knowledge, and despite the countless efforts of inventors and imitators, they remain unfathomable.

On the other hand, still-existing antiquated ideas we are imitating unconsciously. Example: the mono-wheel and mono-rail idea of transport we have heard much of in the past decade, but I can show the reader ample photographic matter proving the current everyday use of the mono-wheel system of transport for both passengers and freight throughout the cities of the China Republic.

The secret of human flight is but another of the lost sciences! And in this paper we have endeavored to show that it is but "another old story." And bronze, eternal bronze, now helps to the unfolding of the truth!

GOVERNMENT BRONZE MIXTURES.

The mixture of government bronzes known as 1, 2, 3 and 4 is as follows:

BRONZE NO. 1.

Copper	96%
Tin	4%

BRONZE NO. 2.

Copper	88%
Tin	10%
Zinc	2%

BRONZE NO. 3.

Copper	57 %
Zinc	42.5%
Tin	0.5%

BRONZE NO. 4.

Copper	58.54%
Zinc	38.70%
Steel alloy	2.55%
Aluminum	.21%

The steel alloy used in bronze No. 4 is composed of the following constituents:

Pure tin	29.03%
Wrought iron	58.06%
80% Ferro-manganese	12.91%

A low grade of zinc is used in bronze Nos. 2 and 3 and a high grade in No. 4. The bronzes of grades Nos. 1 and 2 have not been entirely satisfactory in the manufacture of sea-coast gun carriages and when metal requiring the physical properties of these bronzes is called for, the mixture for bronze No. 3 is used as a substitute.

COPPER SUPPLIES IN JAPAN.

Owing to disturbed market conditions and transportation difficulties, the stock of copper in Japan has steadily increased since the beginning of July and is now reported to be twice the amount in normal years. Prices, though at times irregular, are nevertheless quite well sustained, ranging from $256.50 to $264 per ton.

THE CRUCIBLE BUSINESS

SOME REMINISCENCES OF AN EXPERT MANUFACTURER LOOKING BACKWARD A QUARTER CENTURY.

BY JONATHAN BARTLEY.*

(Continued from January.)

The manufacture of graphite crucibles in the past was considered a very secretive business, and it is very interesting to recall the animosity that existed at one time among some makers. It is related upon substantial authority that one manufacturer when weighing out his "mixings," had a heavy bar protecting the door of his weighing room, and when he entered this room all shades were drawn, and the utmost precaution observed to prevent the slightest knowledge of the formulas being used. Another amusing incident recalls the spectacular manner in which one competitor annoyed and confused another maker in the apparent attempt to auction off once or twice a year, two or three shares of stock that the one concern held against the other. This procedure was as follows. Crucible maker No. 1, having these few shares would at least once a year employ a brass band and a tally-ho coach with large signs on both sides reading "——— crucible stock for sale today." After a few tunes, such as "There'll be a Hot Time in the Old Town To-night," the caravan would move on to the front of Competitor No. 2's plant, where, after playing a few more high-class selections from vaudeville, would repair back to the city where an auctioneer awaited them to dispose of this valuable asset. It was, however, noticeable that the stock offered was invariably bought up by its original owner. These and many more like incidents that took place in times past show the very narrow channel through which the crucible business was conducted. This feeling to a great extent has died out, and the makers are now on more friendly terms, although there is a more or less distrustful air that should not exist. The manufacture of graphite crucibles IS NOT A SECRETIVE BUSINESS, neither is it a SCIENTIFIC one when the word science is used with its proper meaning. It is a very simple business when compared with thousands of others. It means, first, a thorough knowledge of raw material; second, to be equipped with the proper machinery; third, a proper formula to meet the various conditions, and after these it is simply a matter where "Eternal Vigilance" is the price of liberty."

CRUCIBLE MATERIALS.

The component part of a graphite crucible is the graphite, on account of its inertia and great conductivity of heat. This material which is particularly adapted for crucibles, comes from Ceylon in three forms of size, known as lump, chip and dust. The lump in size, figuratively speaking, compares with what we know as "nut" coal, and resembles the same to some extent. The chip comes to us in small flakes something like the old-fashioned flour bran, but somewhat thicker. The dust is on the order of coarse ammunition powder. There are three grades of quality in each size, but only the highest grades are adaptable for crucible making. The lump and chip are ground separately and sized properly, the dust sieved to prevent any foreign matter getting in, such as nails, broken bits of wood from the barrels, etc. Then comes the proper "blending" on which no cast iron rule can be laid down, because, like all other material that comes from "Mother Earth," the grades will vary at times, so that in order to keep the carbon contents the same, it requires certain manipulation. For example, the crucible to give best service in ordinary brass work should carry about 46 per cent. carbon, and an analysis will show if any of the three grades are up or down, and a proper "blending" will bring the proper results.

Crucible makers have always depended on Germany for their clay. It comes from the town Klingenburg, of about 1,500 inhabitants, located about sixty miles from the River Rhine. A local tax is exacted on all clay coming from these mines, thus relieving the people of any taxes, as this revenue is sufficient to carry all expenses. The clay is transported to the Rhine via canal, and as this canal freezes up about December and does not open until April, all exportations cease for at least four months every year. Clay comes to America in large casks that carry about 1,200 pounds. When it reaches us it contains a large amount of moisture, which has to be eliminated before it can be used. After it is thoroughly dried it is prepared to mix with the other ingredients acting as a binder. This preparation varies with different makers, some breaking it into small lumps and soaking it to a pulp, while others grind it to a powder. I have adopted at times for experiment both methods and found one as practical as the other. Now comes the matter of "mixing." Here too, the method varies with the makers, but while their views may differ, the fact that they all secure what they are after in the way of a thorough mixing places this above a debatable point.

MAKING THE CRUCIBLE.

Following the mixing comes the making, or forming the crucible. This is done on what are known as jiggers, and I might say here that the type of these machines differ in the various shops, and while I have tried them all I am free to say that as far as my experience goes there is no difference in any of them as to the quality of crucibles. The first procedure now is to prepare the mixture for the jigger, which means the weighing of the proper amount of material to enter the size crucible being made, and then it is "slapped," or in other words broken apart many times and knitted together again with the purpose of expelling all air cells that come from the original mixing. This is done by hand and requires more or less skill which is obtained by practice. When this operation is complete the ball is handed to the jiggerman, who places the same in a wood or plaster of Paris mold which gives the outside contour of the crucible. The inside is formed by a cast iron pattern which gradually brings the material to the top until it is stopped by a register gauge, giving each crucible the same thickness of wall. After the crucible is perfectly formed, it is left in the mold until a natural separation takes place, then the mold is taken away and the crucible goes to the finisher, who smoothes out all lines or crevices, after which it is placed on the drying rack and allowed to dry in the most natural way possible. This takes a long time.

For example, a crucible size No. 60 will require at least four weeks under the best conditions to prepare it safely passing through the burning process. The object in burning a crucible is simply to calcine the clay body and render it less impervious to what is commonly called "scalps." The burning process requires time. For example a kiln with say 75,000 numbers capacity, will take at least six days to discharge, recharge, and cool off. Crucibles are burned at a temperature a little below the melting point of brass, which fact demonstrates that if a "scalp" occurs later on in the foundry, the fault lies in its not being properly annealed. At the same time this has been one

*Crucible Manufacturer.

of the most difficult troubles the manufacturer has had to combat, however, the incessant hammering through the trade papers during the past few years has had a very beneficial effect in this direction. When the crucible leaves the kiln it contains less than one quarter of one per cent. moisture, but after cooling off it absorbs moisture readily, and its future action as regards to "scalps" is entirely up to the foundryman. In this issue I have in a general way given an outline on the manufacture of the crucible. In the next issue I will endeavor to point out some of the nerve racking "Heart Throbs" that daily confront the crucible maker.

(To be continued.)

SMALL ALUMINUM TUBES

A Description of the Dies and Tools Used in Their Manufacture.

By J. P. Sheehy.

Little information has appeared in the technical press on the subject of drawing dies for the manufacture of aluminum articles, and the writer considers that this line of work is only in its infancy. A large majority of drawn shape are made of aluminum owing to its lightness, durability and being much cheaper to work, as the shells or articles do not have to be annealed after each operation. I recently designed and completed a set of dies for producing a tube ⅞ inch in diameter and 3½

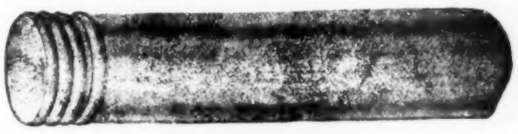


FIG. 1. AN ALUMINUM DRAWN SHELL.

inches long with a screw cover made from .026 sheet aluminum, as shown in Fig. 1, and the successive drawing operations, as shown in Fig. 2. The tubes had to be true to size in diameter and height, smooth inside and

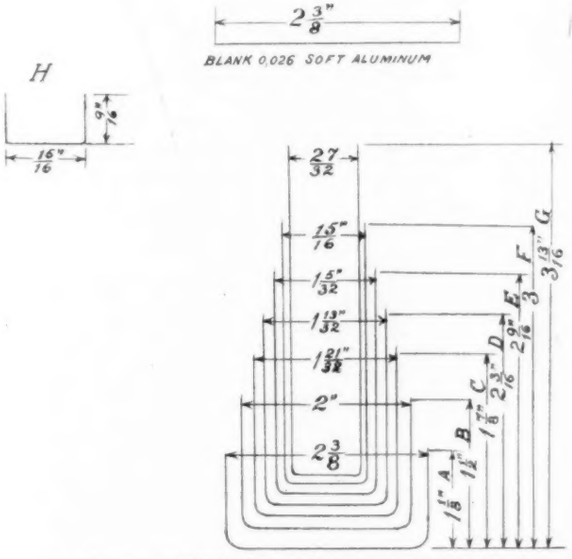


FIG. 2. SUCCESSIVE DRAWING OPERATIONS TO MAKE CASE SHOWN IN FIG. 1.

out, and a strictly first class article in every way. The first blanking and drawing die is used in a Farcute double action press which blanks and draws the shell as shown at A, Fig. 2, in one stroke of the press. The die holder A, Fig. 3, is made of cast iron, while the drawing die, B, is made of tool steel carefully hardened and ground. The drawing punch, C, is made of tool steel hardened and ground. The blanking punch, D, is made of machine steel and is not hardened. This punch has to be a very close fit and leaving it soft makes it possible to be upset from time to time as it becomes dull, which will insure a close fitting and sharp punch at all times without grinding or annealing. The life of one of those punches is about 1,000,000 blanks and shells. The shells are stripped from the punch, C, by the back or bottom edge of the die which is left sharp when ground, and which has to be sharpened from time to time by grinding the bottom which will not affect the size of the shell.

The reducing punches and dies are made of tool steel, as shown at Fig. 4, A, the drawing die is made of tool steel discs hardened and ground and to fit standard die holders. The reducing punches are of tool steel hardened and ground. Great care must be taken in making the above tools, as the accuracy of the work depends on the tools and also the speed in manufacturing the shells.

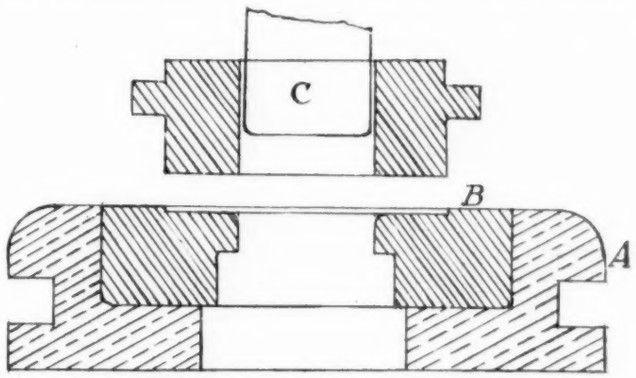


FIG. 3. DIE HOLDER AND DRAWING DIE USED IN THE OPERATIONS SHOWN IN FIG. 2.

This shell is reduced six times to get the required size and great care must be taken in the making and laying out of the reducing punches so that each will do its right portion of the work and that they fit properly. If too loose they will cause the shells to lap or wrinkle and the shells will split on the next operation. If the reducing punches and dies be too tight it will harden the stock and therefore cause the shells to break off at the top as they are being reduced.

The reducing punches and dies for the succeeding operations are made in the same manner as shown in Fig. 4. Again returning to Fig. 2 it will be seen that the shells do not increase in height to any great extent until the last operation is reached, which increases the length of the shell 13/16 inch and also reduces the thickness of the stock to .010 of an inch. The shells are left very hard and have a fine polished appearance after this operation. The shells are washed and dried and go to the edging or turning lathe to be trimmed to the proper length. It will also be noted that the shells have not been trimmed or annealed. If proper care is taken in the setting of the tools the shells may be reduced several times more to smaller diameter without any extra trimming or annealing.

The cover shown at H, Fig. 2, is made on tools of the same design as shown in Fig. 3, and require only one set of dies to bring it to the dimension given, which give 1/16 of an inch to be trimmed off. The shells are washed and dried and are now ready to be trimmed to the required dimensions, which is done on a Blake and Johnson hand trimming lathe. The next operation is rolling a bead 3/8 of an inch from the top of the tube which is used as a stop for the screen cover which screws down against this bead and improves the appearance of the tube. This bead is a trifle larger than the outside diameter of the

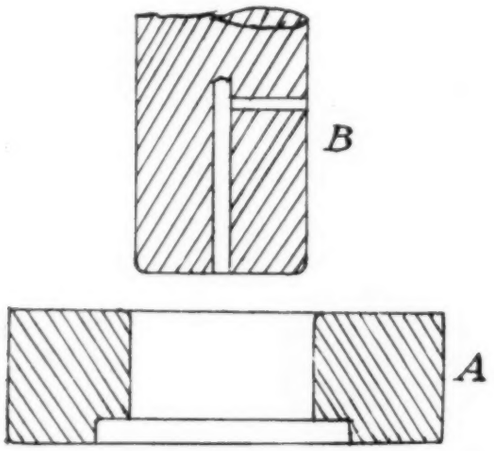


FIG. 4. TOOL STEEL REDUCING PUNCHES AND DIES.

cover. This operation is also done on a Blake and Johnson trimming lathe with tools as shown in Fig. 5. A, rolling chuck made of machine steel, a roller, B, made of tool steel are brought against chuck, A, which will make a very true bead. The shells, both cover and tube. are now ready to be threaded which is done on a thread rolling machine—the tube have the threads rolled out while the cover have the threads rolled in, using two

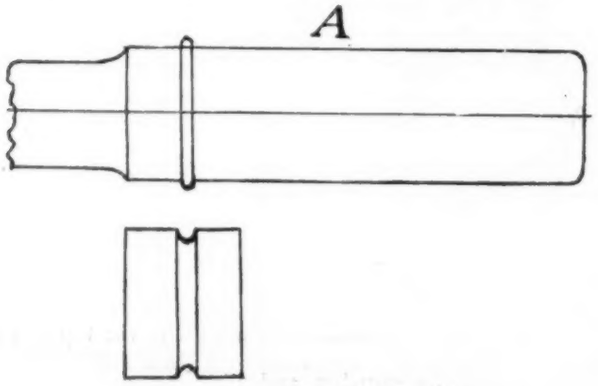


FIG. 5. TOOLS USED ON TRIMMING LATHE.

complete sets of tools. Great care must be taken on this operation and setting of the tools so as not to roll the cover or tube too much or too hard which will stretch the metal and the cover will not fit properly and cause a waste of time in assembling. The shells are now sent to the finishing department where they are thoroughly cleaned by washing in potash, rinsed in clear, cold water, and then put into a solution of nitric acid which when mixed properly and kept clean will give excellent results. Four parts of soft water to one part of nitric acid will give results. The shells are thoroughly rinsed again in cold water and dried in hardwood sawdust—maple sawdust will give best results. They are now satin finished, which is done with a fine steel-wire brush. If the shells are not thoroughly cleaned they will not brush and any defect will show up plainly in this operation. The shells are now ready to be assembled. There is a thin cork placed in the cover and wax is rubbed on the threads of the cover and tubes giving them an oiled surface, which will not tarnish the finish and will screw together much easier than if the cover was put on without wax. It would be also impossible to take them off again without destroying the tube as the metal is dry and rough.

ZINC AS A BOILER COMPOUND.

A recent order placed in this country for export of four hundred thousand pounds of zinc calls attention to one of the uses for which this metal has been applied abroad, which perhaps is not universally known in the United States. The order referred to above was for pure zinc in the form of plates 6 inches long by 4 inches wide and a half inch thick. These plates had a half inch hole bored or punched through the center and the method of using them is as follows:

A steel rod is introduced through the side of a boiler and these plates of zinc together with steel or iron washers are strung on the rod in alternate layers so that there is constant contact between the zinc and iron all the way across the boiler. When the boiler is in use this arrangement of the two metals constitutes an electric couple and galvanic current of electricity is set up inside the boiler which, it is claimed, effectively prevents not only foaming of the boiler but also the deposition of scale. In this way the use of various materials known as "boiler compounds" is eliminated and the boiler is kept in a good clean condition for an indefinite period.

There does not seem to be any reason why aluminum plates used in the same way will not produce the same results and possibly, owing to the difference in specific gravity between aluminum and zinc, more surface may be offered for action by using aluminum.

ZINC SMELTING IN AUSTRALIA.

It is reported that the smelting of zinc, which has been the mainstay of the German zinc smelting business, is about to be lost to that country. The Australian production of zinc ore, which has in recent years been the largest single source of spelter in the world, has heretofore gone to Germany for smelting. Due to the interruption of the war, this has been stopped and the Australian producers have been forced to look elsewhere for an outlet of their ore production.

Negotiations, therefore, are now in progress between the zinc corporation and other Australian producers for a combination of their interests in the smelting of their output. To this end the American Smelting and Refining Company is now in consultation with these Australian concerns for the erection of new smelting works. Therefore it looks as though there is an impending revolution in zinc smelting which will make a material difference to the German and Belgian smelters.

PRICES FOR CHINESE ANTIMONY.

Two thousand tons of antimony ore are offered on sale in Hankow at present for 9 taels, or $5.75 gold, per ton for each 10 per cent. of antimony; that is, for 60 per cent. ore the price is 54 taels, or $34.50 gold. On contract for two months' future delivery 500 tons of crude antimony are offered at 95 taels or about $60 gold a ton. Japanese are reported to be buying at present at this price. Three hundred tons of antimony regulus are offered at 240 taels, or about $153 gold, per ton.

SOME METHODS USED BY PLATERS TO PRODUCE BRIGHT NICKEL DEPOSITS

A Resumé of the Various Materials in Use At th e Present Time.

By Charles H. Proctor.

Bright nickel plating salts have claimed the attention of the plater for a considerable period. On their first introduction the plater was very much interested, but at the present time the interest seems to be on the wane as there are so many of these salts upon the market it is somewhat difficult to decide which of them will give the best results. It is not my intention to enter into a discussion of the relative value of such salts but to give some methods in use by platers, whereby such results can be obtained with the usual combination of the double and single salts.

The basis of the various bright nickel salts is no doubt nickel ethyl sulphate. A German patent was granted in 1905 covering this compound. The ethyl sulphate combinations brought forth such prepared German salts as Mars, Lipsia, Germania and Neptune salts for the production of dense bright nickel deposits of unusual thickness. These same salts are probably sold in this country today under new names and with slight changes in their combinations. Magnesium sulphate no doubt enters largely into the combination of such salts.

The foreman of a plating department in a large plant who installed bright solutions found it was possible, after the initial solutions were in use for some time and needed replenishing, to use nickel and magnesium sulphate and a small amount of sulphate of ethyl for the purpose. This addition of sulphate of ethyl may bring up the thought that this material might be used as a brightener for nickel solutions of ordinary compositions. It might be worth while for platers, who have the facilities, to experiment along these lines and try out small solutions upon a practical scale. If the material proved successful for the purpose, then it might possibly be used in other solutions for the same purpose.

A year or two ago the writer visited a number of small plants in Connecticut and noted that connected to the positive pole of the nickel tank were a number of small metal rods about nine inches long and three-eighths of an inch in diameter that had the appearance of being composed of zinc. Upon inquiry the information was imparted that these rods had been purchased from an Englishman who claimed to have been in charge of the extensive plating plants of the Elkington Company, of Birmingham, England, and were used for the purpose of brightening the deposit when it became dull. The small metallic sticks, which the writer afterwards found to consist of cadmium, were left in the solution over night and removed the next morning before the regular day's work was begun. In every instance where the cadmium sticks were used the same beneficial results were claimed. Just what action the cadmium could have upon the solution of nickel it is somewhat difficult to explain. The metal is slowly dissolved by strong acids, equal parts of nitric acid and water having been found the most satisfactory material to reduce the metal electrolytically. As nickel solutions contain comparatively little free acid we can hardly ascribe the results due to sulphate of cadmium. Cadmium like zinc produces hydrogen in the presence of dilute acids and it might possibly be that the continuous evolution of hydrogen in the bath, when not in operation, may have a beneficial influence upon the solution acting as a clarifier. Not only cadmium but any other metal that will produce this evolution of hydrogen will no doubt produce similar results.

In the nickel plating department of a well known stove and range manufacturing concern the same results are obtained by hanging sheets of cold rolled steel upon the cathode rods quite frequently at night time or over Sunday. Hydrogen is produced and is liberated through the solution. The deposit produced by this company is beautiful and white and no trouble ever develops from pitting. A short time ago when in a plating department of a concern in Philadelphia the writer noted that connected to the positive pole of the nickel tank were sheets of zinc. Upon inquiry as to the use of the zinc the writer was informed that they were used at night time in the solution. The action of the solution upon the zinc produced a bright deposit and samples of the work that came from the solution were shown to the writer and they appeared to be as bright as when buffed. As zinc and cadmium are closely analogous to each other the theory of the evolution and liberation of hydrogen as a clarifier was again predominent in the production of a bright nickel.

That cadmium seems to play an important part in the development of a bright nickel deposit may be inferred from the results obtained by Mr. John McCarthy, foreman of the plating department of the Budge Beach Manufacturing Company, of St. Louis, Mo., who claims he can produce a nickel deposit as white as silver and as bright as when buffed. The formula that he uses consists of the following proportions added to a bath of two hundred gallons.

Chloride of cadmium	16 ounces.
Nickel sulphate	16 ounces.
Boracic acid	8 ounces.
Chloride of sodium	2 ounces.
Water	3 gallons.

A boiling solution should be prepared from the above material and when all is dissolved should be added to the nickel bath, preferably on a Saturday evening, and the bath well stirred so that the brightener becomes thoroughly mixed. The usual replenishing is carried out in the regular manner and after the initial addition of the brightener is made a stock solution should be prepared in a condensed form, that is, using only sufficient water for proper solution of the materials described. As the deposit becomes dull a small amount should be added to the solution as occasion requires to maintain the brightness of the deposit.

In the foregoing article the writer has only described methods that have come under personal observation or communications in writing, the originals of which are in my possession and so I do not claim originality in any method herein described.

NICKEL SULPHATE NOT AN ALLOY.

The Board of General Appraisers in a recent United States Custom ruling decided that nickel sulphate is not an alloy of nickel nor is it, strictly speaking, nickel or nickel oxide, but is a chemical salt or compound of nickel. This decision was rendered through the protest of Fuerst Brothers and Company, of New York, who claimed duty at ten per cent. on the material as nickel oxide or alloy. The collector had made an assessment on the merchandise at 15 per cent. ad valorem under the act of 1913, as a chemical compound or salt.

JAPANNING, ITS ORIGIN AND DEVELOPMENT*

And the Application of Gas in the Baking Process.

By M. Rosenberg.

Japanning is an art which originated with the Japanese, whence it takes its name. The process consists of applying an opaque black varnish to the surface of the material to be japanned and baking it on by means of a high temperature in specially constructed ovens. The Japanese made their varnish, or lacquer, as it is sometimes called, by collecting the juice from a certain kind of tree and exposing it to the air, which caused it to assume a deep color, after which pulverized charcoal was added to it. The varnish so made was then applied to the surface of the material to be coated therewith in several successive coats, each coat being baked in the sun before the next coat was applied. After the final coat had been baked it was polished with a stone and water which produced a smooth glassy finish.

The methods employed in modern manufacture are quite different to those practiced by the Japanese. The japan varnish used at the present time is composed chiefly of asphaltum, gum, linseed oil, turpentine, benzine, and coloring metal, such as charcoal, bone black, etc.

The ingredients are used in various proportions, each manufacturer of japan varnish having his own formulae for the different grades of japan. Therefore no definite formula can be given, nor is it necessary for our purpose.

PURPOSES AND APPLICATION.

The purposes of japanning various materials are:

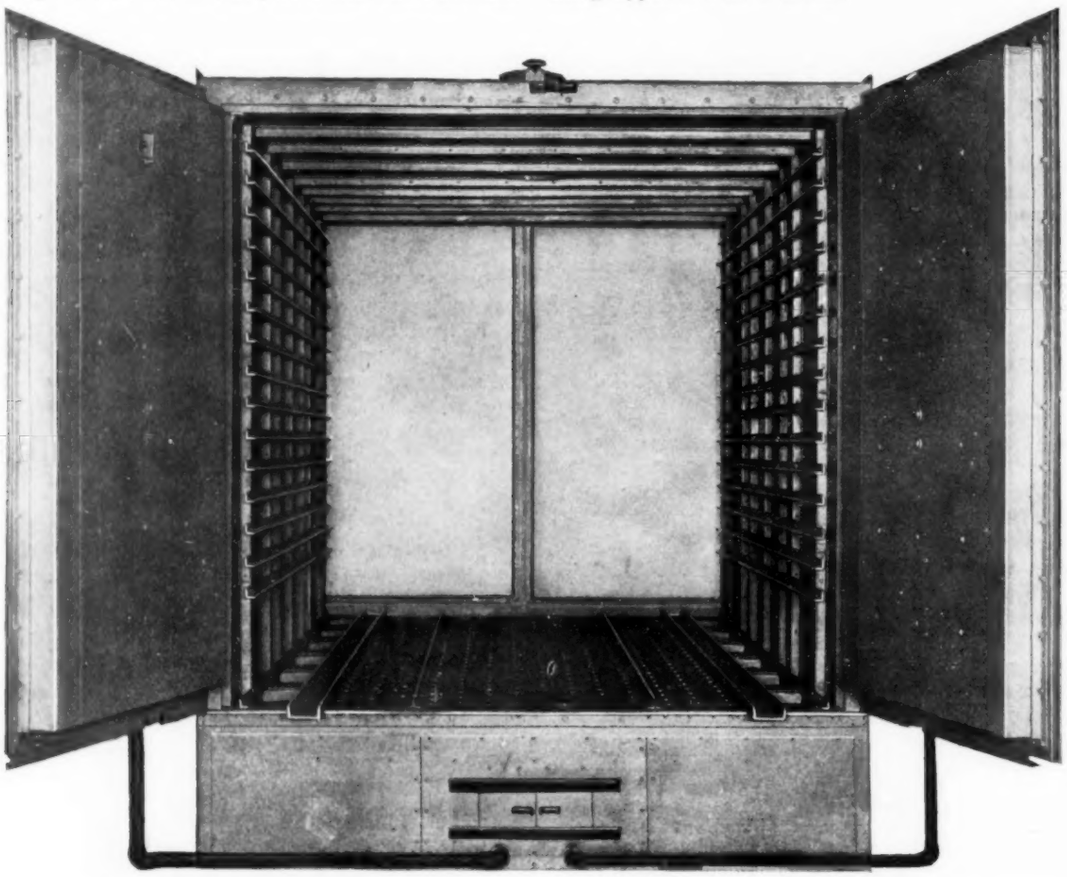
To protect them from corrosion, such as rusting or tarnishing (if they be made of metal).

To protect them against chemical action, decomposition or decay.

To decorate.

There are various methods of applying japans; namely, brushing, dipping, tumbling, and spraying.

The brushing method is similar to painting, the varnish being applied with a brush.



DIRECT HEATED NON-EXPOSED FLAME TYPE JAPANNING OVEN MADE BY E. E. STEINER & COMPANY, NEWARK, N. J.

In the dipping method, a tank is employed which contains the varnish, reduced to the required consistency with turpentine, benzine, or some other reducing agent. The material to be coated is dipped into the liquid and then hung up over dripping pans which slope to the dipping tank so that the drippings run back to the tank.

The tumbling method cannot be generally applied, as the shape or size of some materials does not permit of tumbling, but it can be successfully applied to small parts, or parts that will tumble easily. A tumbling barrel is employed and a small quantity of the varnish is poured into the lower part of it and the parts tumble through it, thereby becoming coated.

The spraying, or air brush method, as it is better known, consists of an atomizer into which the thin varnish is fed, and which is operated by air pressure from a compressor which atomizes the liquid so that it can be applied in a very fine spray. This latter method is the most modern and can be applied in almost, if not, every

*January Bulletin National Commercial Gas Association. Copyrighted 1915.

case where the other methods are employed. It gives better results, in most cases, no dripping being necessary, as only the exact amount of varnish required is applied.

DRYING AND BAKING.

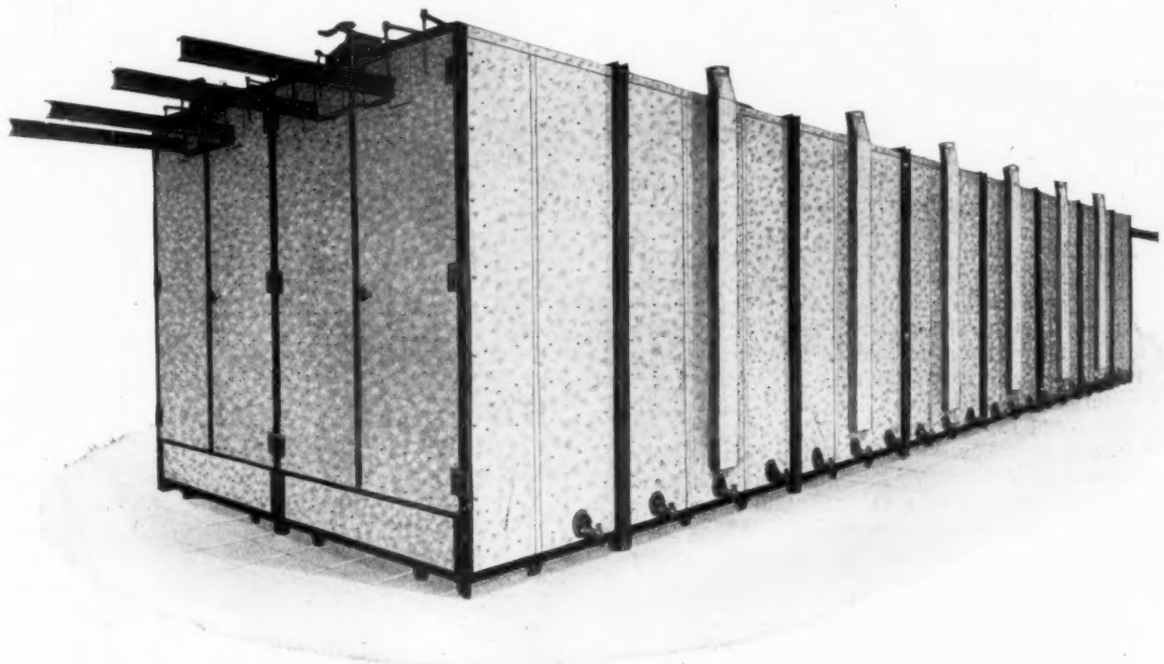
After the varnish has been applied it is either air-dried or baked. The air-dried japan is inferior in every respect to the baked japan. The air-dried japan does not possess the hardness or finish that the baked japan possesses, and does not wear nearly as well in consequence. It requires considerable floor space and considerably more time to do the work where the air-drying method is employed than where the baked method is practiced, and furthermore, the air-drying japans cost considerably more than baking japans. It might be said in this connection that the so-called air-drying japans are not japans, as the term japanning implies a baked product. Pure baking japans require at least from 300° to 350° F. in order to bake properly. Air-drying japans can also be baked, thereby accomplishing a considerable saving in time, but cannot stand baking at as high temperatures as the regular baking japans. An air-drying japan that will require 24 hours to dry at ordinary temperatures can be baked in 3 hours at 180° F. with equally good, if not better, results. The baking japans may be baked at various temperatures, ranging from about 300° to 600° F. As there are various formulae employed by the different manufacturers of japan varnishes, it is always advisable for the japanner to ascertain from the manufacturer the proper baking time and temperature for the particular japans that he is going to use.

Not all materials will stand the higher baking temperatures, such as wood and soldered metal. It is therefore necessary to select a japan that will bake at such temperatures as will not injure the materials, *e. g.*, half and half solder melts at 370° F.; it is therefore necessary to use a japan for soldered material that will bake below the melting point of the solder used.

Each particular kind of japan can be baked at different temperatures, but in doing so the baking time must be varied with the temperature. An illustration of how one particular kind of japan can be manipulated will here be given:

Time in Hours.	Temperature.
4 to 5	at 300° F.
3	at 350° F.
1½	at 400° F.
¾	at 500° F.

The above table applies to one particular kind of japan and the results obtained whether it be for the 5 hours at 300° F. or ¾ hour at 500° F. are the same. Other japans can be handled in a similar way. In order to get the proper results it is necessary to bake the japans at the temperature and for the length of time specified by the manufacturer of same. If this is done a smooth, hard, yet elastic finish is secured, which wears well and has an attractive appearance. If the japan is baked in less time or at a lower temperature than prescribed it will be underbaked and will be tacky, *i. e.*, sticky and will not wear well, as it can be easily scratched or bruised. If baked longer or at a higher temperature than specified it becomes over-baked and loses its elasticity and will easily chip and scale off.



GEHNRICH RADIATOR TYPE DOUBLE TRUCK LOADING OVEN MADE BY HERMANN GEHNRICH, BROOKLYN, N. Y.

COATING AND FINISHING.

The articles to be japanned may be made of metal, wood, leather, papiér maché, slate and a variety of other materials.

The articles receive one or more coats, each coat being baked before the next is applied. For the cheaper grades of work but one or two coats are given, whereas for the higher class of goods several are applied, sometimes as many as six coats. The first coat is called the "filler or primer" and is intended to fill up the pores, scratches and rough surfaces in the material. The successive coats are then rubbed with powder and pumice and water after having been baked; sometimes only the final coat is rubbed, all depending on shop methods.

When the article is finally finished it has a smooth hard finish which may be either dull or glossy, depending upon the kind of varnish used.

COLOR JAPANS—JAPAN ENAMEL.

Materials are also finished in other colors than black; any finish desired can be obtained whether it be white, cream, yellow, red, blue, green, or any of the great varieties of colors or tints. The color finishes are termed "Japans" by some people in the trade and "Enamels" by others, neither term being correct in the strict sense, since a japan is always black or dark brown and contains asphaltum or gum, whereas the colors contain neither asphaltum nor gum, but are merely composed of varnish and a pigment. An enamel, on the other hand, is an entirely different substance than japan, being a vitreous substance combined with a metallic salts which is fired onto the material at a high temperature, 1,600 to 1,800° F., and can only be applied to metals and other materials that will stand such temperatures. In order to avoid confusion some different term should therefore be used and the term "Japan-Enamel" will probably serve the purpose very well and therefore will be used in this paper.

The "Japan-Enamel" process is similar to the japanning process, the methods of application, handling and baking being the same, excepting that japan enamels must be baked at much lower temperatures than the japans, ranging from 150 to 160° F. for 2 to 2½ hours up to 180° F. for 3 hours, the lower temperatures being required for the lighter colors and tints, the higher temperatures for the darker colors. Some manufacturers advise baking their japan enamels as high as 275° F. Great care must be taken to maintain uniform temperatures in this work, as a few degrees difference will produce a different color, *e. g.*, a white japan enamel which requires baking at 150° F. will change to a cream if baked to 165° F. and a similar result is obtained with all of the other colors. It is therefore extremely important that the oven be so constructed as to maintain a steady and uniform temperature in all parts and throughout the entire baking process.

OVENS AND FUELS.

The most suitable kind of oven for baking japans and japan enamels is without question the indirect heated gas fired oven which is constructed with special heating chambers, so arranged that the heat is radiated into the baking compartment and having separate flues for carrying off the products of combustion and the vapor occurring in the baking process. Other kinds of fuels have been and are still being used, but are rapidly being displaced by gas. The other chief methods of heating ovens are the coal stoves and the steam coil. That gas is superior to steam for heating japanning ovens is best attested to by the fact that many large manufacturing plants equipped with boilers of ample capacity have substituted gas for steam, finding that better results are obtainable when gas is used, a better product being secured. Where high temperatures are required a very high steam pressure would be necessary, *e. g.*, if 400° F. are required it would require a steam pressure of 250 pounds per square inch in the oven in order to heat the oven to the desired point, which is impractical.

If coal is used for heating the oven, it will require considerable time to get the oven ready for baking, as it is necessary to clean the stove and build new fires frequently, causing a great deal of dust and dirt which is the bane of the japanner. Beside this the temperature cannot be regulated due to changing atmospheric conditions and all other variations that a coal fire is subjected to. In a gas fired oven, as heretofore described, it is possible to heat the oven in a short time to any desired temperature and to maintain an even temperature at all times.

CHARGING OR LOADING THE OVENS.

The ovens are charged or loaded with the japanned materials by either carrying the materials to the oven and suspending them from bars, placing on shelves, or such other method as is found most convenient. This is known as "hand loading." Or they may be placed on a truck arranged to accommodate the materials, and when the truck is loaded it is pushed into the oven and the baking process begun; this is known as the "truck loading method" and has many advantages over the hand loading method where conditions permit of its use.

With the hand loading method it is necessary to carry the materials into the oven, taking a few pieces at a time which require many footsteps. It is necessary for the oven to be cold for loading, as a man cannot enter a hot oven, and it is also necessary to allow the oven to cool before it can be unloaded for the same reason; this entails a considerable loss of time.

With the truck loading method the japanner has the truck close to him, and he places the materials on it as he coats them. When the truck is loaded he pushes it into the oven; sets the oven in operation, and proceeds to load a second truck. When the first truck has been in the oven for the required length of time, it is pulled out and the second truck is pushed into the oven. It is not necessary for the oven to be cool for loading and unloading where this method is employed, which fact increases the capacity of the oven to a considerable extent and saves heat and labor. The truck loading method is becoming quite general owing to its many advantages over the hand loading method.

SOME ARTICLES THAT ARE JAPANNED.

It would make a very long list to mention all of the articles that are japanned and would require an extensive investigation to make up such a list. A list of some of the articles will be given which will suffice. There are: typewriter frames and parts, adding machine parts, sewing machine parts, automobile bodies, fenders, mudguards, horns, lamps and other parts, metal furniture; grocers' tinware, such as spice and coffee boxes, etc.; domestic tinware, such as flour, bread and cake boxes, etc.; metal buttons, buckles and ornaments, springs, scales, motor cases, telephone and telegraph apparatus, electrical apparatus, umbrella handles, rods, ribs, etc., lamps and lanterns, ash cans and a great variety of other articles.

POTASH FROM CANADIAN FELDSPAR.

Consul Felix S. S. Johnson reports that owners of feldspar properties in the Kingston district of Ontario Province are experimenting in the extraction of potash from ground spar.

metal has been brought home a cup has been produced that the finishing chuck will enter and on this the metal is forced into the concavities as with other operations of spinning. If the monotony of the surface is not pleasing equidistant lines may be turned with the diamond point tool and serve as an ornament. Then, after trimming the top edge, the chuck is removed in sections and a vessel has been produced with an uneven contour.

SULPHURIC ACID PRODUCTION.

Sulphuric acid produced at zinc and copper smelters is a factor of increasing importance in the acid industry of the United States. According to figures compiled by the U. S. Geological Survey, the 1914 production from this source amounted to 790,296 short tons of 50 deg. acid, valued at $4,346,272. Copper smelters produced slightly more than zinc smelters.

BRASS FOUNDRY EQUIPMENT AND MANAGEMENT

SOME COMMON SENSE REMARKS BY AN EXPERT FOR THE BENEFIT OF THE TRADE.

BY W. H. PARRY.*

(Continued from January.)

CHOICE OF MOLDING MACHINES.

If, after you have gained a fair knowledge of the limitations of the cheaper types of molding machines, you care to go a little deeper into the game, there are "oodles" of molding machines on the market which are so designed that any kind of work can be made on them. Not wanting to be accused of being the press agent for any particular make of machine, I will not mention the manufacturers' names, but rather the conditions that should govern the selection of the various types.

Stripping plate machines are very cheap as compared with other types, but while the machine is cheap the work of mounting the patterns thereon is anything but inexpensive and unless you have lots of "long run" jobs, and a swell price per pound at that, you had better forget the stripping plate molding machine and go to the split pattern air squeezer, made by a half dozen concerns and all of them good. With this type of machine the pattern mounting expense is not great and gated work can be made, so that all things considered this type of machine answers best the purpose for both a jobbing and manufacturing brass foundry. The other makes such as the gravity, vacuum, roll-over, jolter, rock-down, flask stripping and automatic are very good machines for the classes of work for which they are best fitted, but unless you have money to hand to Rockefeller, leave them alone.

CHOICE OF FURNACES.

In order to keep your "shrinkage" down it is best to start with the ordinary every-day pit furnace in melting the metal. There are many different makes of this type of furnace, including the home-made ones; some using coke, others coal and if you can meet with the requirements of the Fire Prevention Bureau plus the Board of Fire Underwriters you can use crude or fuel oil. City gas is sometimes used and the gas making companies claim great economy and cleanliness by its use, but take it from me, they are only "kidding" you. Producer gas is used in a few places with more or less (mostly less) success, and unless the air is pre-heated and fired into the furnace in a tremendous volume a "chop suey" melt will result.

The open flame brass melting furnaces will melt the metal quickly and lots of it, but unless you can steal from another concern a melter who knows his business, the losses will be high and the metal will be shot full of oxide. So go slow on this type of furnace until you know the game better. The rapid strides now being made by the electric furnaces causes one to hesitate in recommending any of the old types, as the conditions under which the metal is melted in such furnaces are ideal. Again, as this type of furnace is now in actual operation in manufacturing foundries, which have shed their coat of laboratory experiments some moons ago, it is rather difficult at the present writing to advise the best course to take in equipping any foundry unless the local conditions are known.

SAND BLAST EQUIPMENTS.

All up-to-date brass foundries are now equipped with sand blasting apparatus of some kind and there is no doubt whatever that for cleaning castings and at the same time for giving them a better appearance it is a huge success, but there are a few kinks, however, that a beginner should know. An open sand blast nozzle is cheap only in its first cost, as they usually "eat" air at a rate that would bankrupt any small foundryman. Then the operator must don a helmet that gives him the appearance, but not the wages, of a submarine diver. At times, if the operator has any regard for his health, he will wear a respirator, which in plain English is a sponge well saturated with water and which characterizes the worst qualities usually attributed to the "human sponge," that of being able to absorb everything and give nothing in return. Now in all conscience you don't want to rig up a poor fellow-being, with all this paraphernalia just to clean castings, so we will assume that you have enough of the Borden brand of the condensed milk of human kindness in you and would, by reason of that fact, scorn to take advantage of him. Yet you do want to rig up for sand blasting and thanks be to five or six concerns in this noble land of "grape juice" you don't have to ruin men's health by the use of the open sand blast nozzle. As all of these concerns stand ready to separate you from your money in return for the self-contained sand blast machines that are so perfect in design that they can be operated in a parlor without in any way sand blasting the wax flowers plucked from your mother-in-law's grave and now occupying the post of honor over the mantelpiece.

Having proved to my satisfaction at least the remarkable utility of these machines in homes, it may not be amiss, now that I am supposed to be writing for a trade paper and not for a parlor magazine, to point out some of the salient features of the many methods employed in sand blasting. Many of the uninitiated believe that sand blasting a casting will make it smooth and it will if the casting is smooth before it enters a sand blast barrel, but anybody who thinks that a casting with a rough surface can be made smooth by sand blasting it, is a long think from "Tipperary," believe me, as results will show.

The rough surface of a casting is made more pronounced by sand blasting as the holes are made deeper and the points are made sharper, and there is no better way of exposing "coldshots," "misruns," "rat-tails" and spongy spots in castings than to have them sand blasted. There are ways though, my long suffering readers, to get over these hurdles without the aid of a pair of crutches. Never use a sand blasting material, the particles of which are finer than the molding or core sand used in making the casting. For if you do, they will with malice afore thought, seek all the small depressions and in doing so sharpen the sides of same, thus bringing the surrounding points into bas-relief and while bas-relief sounds good, it don't make good looking castings. Crushed steel, steel shot, grit, gravel, silica and very ordinary sands are used to sand blast with and you can get any kind of a surface desired by the intelligent use of either. The "matte" effect is obtained by the use of sand of the various grades, while the polished effect can be obtained by the use of steel grit or shot.

(To be continued.)

*Superintendent National Meter Company, Brooklyn, N. Y.

DIE CASTINGS

THE METAL, ITS USE AND THE GAS APPLIANCES USED IN ITS MANUFACTURE.*

BY C. E. CHAPPLE.†

DIE CASTINGS.

Castings made by the process of injecting by means of pressure, molten white metal into steel molds or dies are known as "Die Castings."

White metal alloys melting between 500° F. and 800° F. have only thus far been available for die castings. These alloys consist of various combinations of zinc, lead, tin, copper, antimony, aluminum and bismuth, the first five being most commonly employed.

Gas fuel is essential to the many stages of die casting manufacture on account of the necessity for close control of temperatures. Should the metal be heated excessively the losses due to volatilization would be great and the change in composition of the alloy on this account would be fatal. High temperature also shortens the life of the dies, the most extensive part of the die casting equipment; so extensively employed in the various processes of manufacture.

In order that this may be comprehended a list of the applications of gas fuel follows, together with a brief description of the appliances and treatment required.

USES FOR GAS FUEL IN PROCESS OF MANUFACTURE.

Treatment of die-cutting tools.
Annealing, hardening and tempering dies.
Melting copper to make primary alloy.
Melting zinc.
Melting and making final mixture.
Melting and keeping molten, metal in die-casting machine proper.

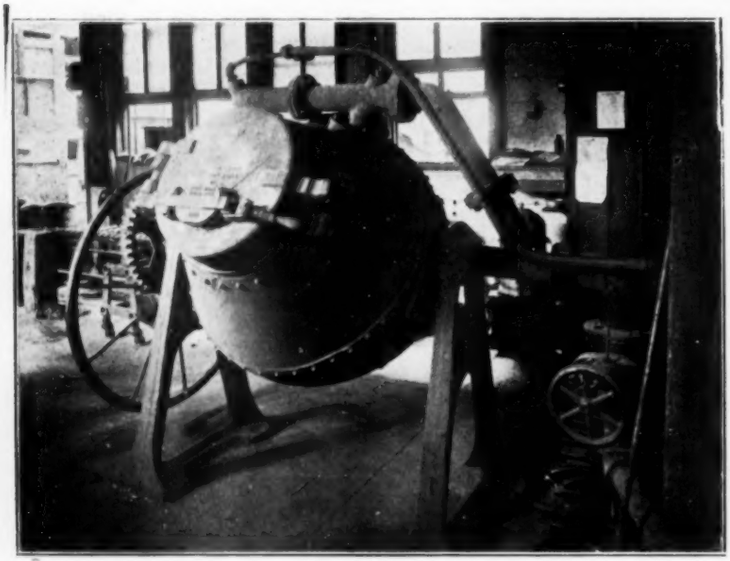


FIG. 1. GAS FIRED HAWLEY DOWN DRAFT MELTER.

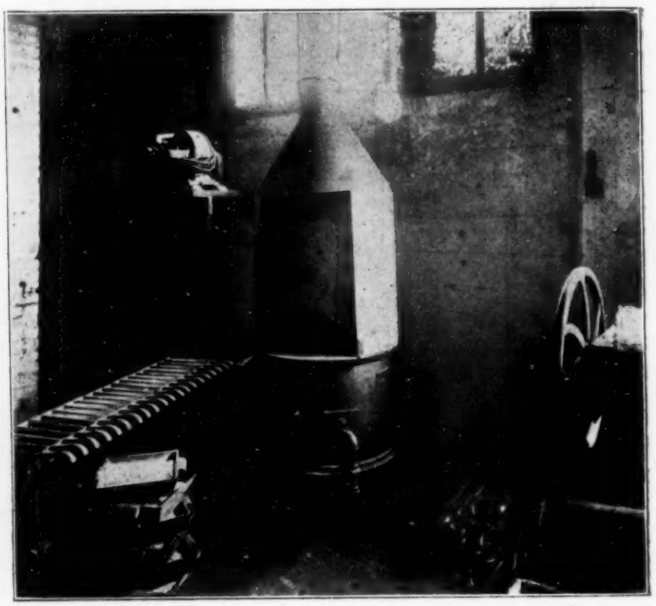


FIG. 2. ONE TYPE OF ZINC MELTING FURNACE.

this on account of increasing the crackage of the steel. On the other hand, should the metal be insufficiently heated the molds would not be filled completely and the castings resulting would be worthless.

This condition of close temperature regulation is best met by gas fuel. Other fuels have been tried and have fallen down completely.

Die castings occupy relatively the same place in the machinery world as do drop forgings. They offer a means of supplying cheaply small metal parts which have been cast with such accuracy that they require practically no further machining, being within one or two thousandths of an inch of correct size and having a surface of great smoothness.

This metal is not as strong as brass and on this account its use is restricted to work not subjected to severe stresses. Its greatest field is in parts for automatic vending machines, automobile lamp bodies, very small electric motor frames and end shields, gears for prepayment meters, raceways for door locks and a multitude of other work of this nature.

In perhaps no other industry is the use of gas fuel

Heating ladles.
Heating die to receive the metal.

TREATMENT OF DIE-CUTTING TOOLS.

These tools are made of either carbon or high speed tool steel, the treatment of which calls for use of standard oven furnaces; high speed steel furnaces; lead hardening furnaces and cylindrical hardening furnaces of suitable size to meet the conditions of work.

ANNEALING, HARDENING AND TEMPERING DIES.

Dies are generally made of 0.60 to 0.80 carbon tool steel, the treatment of which calls for the use of standard oven or semi-muffle furnaces and oil tempering furnaces. The size of these furnaces should be selected to meet the conditions of work.

Oil tempering furnaces may be fired with either atmospheric or blast burners.

MELTING COPPER.

On account of the high melting point of copper (about 1,950° F.) a crucible or some other type of high temperature melting furnace is required. In one plant operating on a very large scale, a No. 2 Hawley down-draft melter (see Fig. 1) is being used in connection

*January Bulletin National Commercial Gas Association. Copyrighted 1915.
†The Brooklyn Union Gas Company, Brooklyn, N. Y.

with a gas booster, which consists of a positive pressure blower, the gas being boosted to 1-lb. pressure and the air being supplied to burners at 12-oz. pressure. This furnace melts 400 lbs. of copper in 35 minutes, using 1,800 cu. ft. of gas. This size and type of furnace was selected on account of the furnace bottom being large enough and sufficiently hot after the copper is melted, to admit of the cold addition of antimony and tin to make the primary alloy without the application of further heat.

MELTING ZINC.

Zinc is melted separately from the other metals used so that it may be purified and cast into pigs for convenience in making the final mixture. (See Figs. 2 and 3.)

On account of the high specific heat of zinc (0.0956), this metal should be melted in a furnace using positive blast burners.

Zinc, when heated above its fusing point (780° F.), has an affinity for iron and absorbs iron from the pot. This forms a thick dross which settles in the bottom of the bath. On this account, a furnace with burners playing on the side of the pot, rather than the bottom, is to be desired.

MELTING AND MAKING FINAL MIXTURE.

The use for which a die-casting is intended and the nature of the casting, from a foundry viewpoint, make it necessary to pour castings from alloys of different compositions. It is, therefore, desirable that the final mixture of metals be made in comparatively small batches —generally in soft metal furnaces of 500 to 700 lbs. capacity (see Fig. 3). As the fusing point of final mixture is about 670° F., these furnaces may be fitted with either atmospheric or blast burners.

MELTING AND KEEPING MOLTEN METAL IN DIE-CASTING MACHINE.

The die-casting machine proper generally consists of a rectangular soft metal furnace, having a pot approximately 10 x 18 x 6 in. deep and with a sufficiently wide flange at the top to permit of the die-casting mechanism being bolted to it. This mechanism consists of a hand operated plunger and receiver, by means of which the molten metal is forced from the pot into the die (see Fig. 4).

There is generally left in the die-casting furnace, from the previous day's work, a small quantity of metal which has to be melted and which calls for the use of gas burners in this furnace for this purpose. After this metal is melted and new metal added to the machine, the function of the burners is merely that of taking care of loss of heat due to radiation. For this reason, atmospheric burners may be safely used, and on account of their ease of control should be employed.

HEATING LADLES.

In order that there be no chilling of metal while it is being transferred from the mixing pot to the die-casting machine, it is generally considered good practice to keep the ladle used for that purpose heated. This may be done by suspending the ladle over a small bunsen or urn burner.

HEATING DIE.

If in starting the die-casting machine the hot metal were forced into the die without having pre-heated the latter, the die would soon give, due to surface crackage. As these dies are exceedingly expensive, this cracking must be avoided. This is done by heating the die to a temperature nearly that of the metal. Blast brazing burners or ordinary bunsen burners made of 1-in. pipe are satisfactory for this purpose.

FIG. 3. A—CRUCIBLE FURNACE FOR MELTING COPPER. B—ALLOYING FURNACE. C—ZINC MELTING FURNACE.

FIG. 4. A SMALL DIE CASTING PLANT. A—FINAL ALLOY BATCH MELTERS. B—DIE CASTING MACHINES.

CANAL CHARGES ON BRITISH COLUMBIA SHIPMENTS.

[United States Consul General R. E. Mansfield, Vancouver, British Columbia.]

The rate established for carrying cargo through the Panama Canal, $1.20 per ton, is regarded by shipping companies on the North Pacific coast as sufficiently low to result in great benefit to British Columbia in the transportation of products of the Province to the Eastern markets. This is especially true of copper and other minerals. The toll assessment is made on the basis of the vessel ton, the standard measure of which is 100 cubic feet of space, and not on a shipping ton of 2,240 pounds. The canal toll charges will therefore add a comparatively smaller amount per net ton weight to the freight rate on commodities of lesser bulk than on those occupying greater space.

SNAP FLASKS

A Few Remarks by an English Observer on the American Use of This Foundry Apparatus.

By a Manchester Student.

Having regard to the almost universal use in America of snap flasks for the manufacture of small castings, it is a matter of wonderment to the writer that so comparatively few are used in Great Britain. The following article is written in the hope that it may induce a few British foundrymen to give the snap flask a thorough trial.

The idea of the snap flask is probably known to all. Each part of the flask consists of a solidly constructed wooden box made in two pieces hinged at one corner and fitted with a fastening at the opposite one, so that it can be clamped into one solid whole. There are many different makes of snap flasks, and provided they are all made of strong, well dried wood or of aluminum, there is probably not much difference between them. Most flasks are fitted with adjustable pins or pinholes by which wear on the pins can be taken up simply with the aid of a spanner or screw driver. The common method is to have blocks on the female part of the flask, which can be slid forward till they make the necessary contact with V-shaped pins when they can be clamped in position. Similar V blocks to those or the female part of the flask can be fixed on to double sided pattern plates, and these can be adjusted to the flask actually used on the job, guaranteeing the absolute freedom of the castings from twists due to badly fitting pins. A certain amount of trouble may be met with at first in taking the flask off the mold which has been completed in the ordinary way. If the molder attempts to open the flask directly, the corners of the mold often stick to the flask, but no trouble will be experienced if the flask is first rapped at the corners and then pressed downwards slightly so that the sand is practically "stripped" out of the flask by the bottom board, which should be small enough to fit inside the flask. The full advantages of snap flasks are only realized when the mold is rammed on a squeezer machine. The advantages that the writer believes are justly to be claimed for the snap flask are as follows:

The first cost of an adequate supply of accurately fitting cast iron boxes is a very considerable item to any foundry. If they are to be used conveniently on accurate work they should all be interchangeable with one another, and this means a considerable amount of accurate machine work. A first class snap flask can be bought for not more than twice the cost of a good iron box. Even with the best iron boxes the upkeep cost is very heavy. Worn pins and pin holes, broken boxes and so on run away with a large fraction of the original cost every year. Probably an allowance of 15 per cent. per year on cost repairs and renewals would be on the low side for most foundries. Against this item, with a snap flask there is only one to look after instead of perhaps one hundred, and any adjustments for wear of pins can be made by the molder.

The third point is the adaptability of the snap flask to different jobs. A snap flask is such a cheap thing that a new size or a special shape can readily be made to enable new jobs to be executed to the best advantage. This is a most important point; with iron boxes jobs have often to be made in boxes really too large for them because they happen to be just too large for a smaller standard box. One special size cast iron box is useless or nearly so. One special snap flask is all that is required except a supply of bottom boards.

Fourthly, the finished snap flask molds are considerably lighter to handle. If a molder has to carry his molds some yards before putting them down, he will appreciate the removal of even a small fraction of his burden. The laborers who knock out the molds and look after sand, boxes and so on, will have considerably less work to do if they have no boxes to carry back to the molders.

Fifthly, with snap flasks there is no chance of limitation of output through the molders being held up for lack of boxes. In every foundry using iron boxes it occasionally happens that there is a run of work in one size of box, and at some time during the day the men are going slow waiting for pouring to liberate a supply of boxes. Against this, with the snap flask every man has an infinite supply of boxes ready to his hand, the pins all adjusted to exactly the degree of tightness or slackness that his fancy prefers or his job necessitates. All that is required is the supply of bottom boards, and these are so cheap and easily made that it is inexcusable for the management not to have an adequate one.

And now to the disadvantages, imagined and real, of the snap flask.

The first disadvantage which would suggest itself to the foundryman unused to snap flasks is the liability for the metal to break out of the mold. This looks to be a great deal more important than it really is. A body of tightly packed sand has quite a considerable strength to resist forces tending to alter its shape, and the metal when it reaches parts of the mold far from the runner and nearest to the edge of the mold is more or less viscous and does not transmit the whole of the pressure due to the head of metal in the sprue. If the casting is big enough for the metal to have filled it, and to be in a perfectly fluid state for an appreciable time, then the risk of the metal bursting out is increased. The risk is in any case minimized by the following two precautions: The patterns should be arranged so as to leave as much distance as possible from the edge of the mold free from patterns, 1½ to 2 inches is usually enough for fairly light castings, and care should be taken that both cope and drag are rammed round the edges either with the shovel handle or some similar instrument. With these two precautions most of the risk is eliminated, but if trouble is still experienced it can always be avoided by slipping jackets over the molds before pouring them. These jackets of wood or iron are made of such a size as to fit snugly round the mold, and when properly fitted the mold is as solid and safe as if made in a cast iron box.

A further point which may suggest itself is that in taking the snap flask off the mold, or in fitting jackets, if such are necessary, it is comparatively easy to shift the cope on the drag giving, of course, castings out of truth. This should not happen if the molder takes reasonable care, but it can be prevented with certainty. If the mold has an irregular parting, or contains several cores hanging bearings both in cope and drag, the strength of these will prevent any but the most careless from getting a shift. In molds with regular partings, depressions and the corresponding elevations can be made part of the mold to form artificial irregular partings. And finally if trouble is still experienced, tapered snap flasks and tapered jackets can be used.

The only other disadvantage of which the writer can think is that through the necessity of leaving a clear border round the edge of the mold, it may occasionally be only possible to get fewer castings into a mold than is possible with an iron box. This is admittedly sometimes so, but, on the other hand, the adaptability of the snap flask may often make it possible to get more castings into a mold only very slightly larger.

A NOTE ON THE ANNEALING OF BRASS*

SOME RESULTS OF EXPERIMENTS AS TO THE EFFECT OF HEAT ON COPPER-ZINC ALLOYS.

By F. JOHNSON, M. Sc.†

In a previous communication** to the Institute the author drew attention to the presence in commercial castings of Admiralty mixture—70 copper, 29 zinc, 1 tin—of a complex eutectoid, the light-colored, brittle, tin-rich constituent of which he then supposed to be the compound $SnCu_4$. Hoyt,‡ in a valuable contribution to the proceedings of the Institute, named this constituent the γ phase. The reticulated appearance of the eutectoid is shown in micrograph Fig. 1, which represents the structure of an alloy of the following composition:

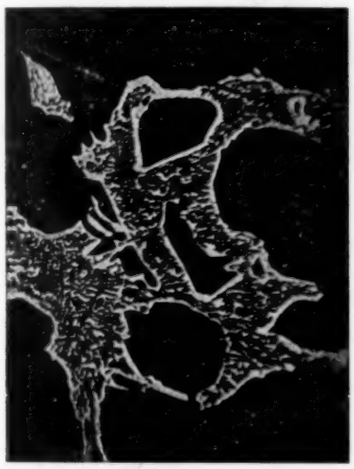


FIG. 1. The Tin-rich Eutectoid in an Annealed Cast Alloy of Copper, 73.14 per cent.; Zinc, 21.73 per cent.; Tin, 5.13 per cent. Magnified 220 diameters. Etched.

FIG. 2. The Eutectoid in an Alloy of Copper, 70 per cent.; Zinc, 29.25 per cent.; Tin, 0.75 per cent. Magnified 350 diameters. Etched.

FIG. 3. The Beta Phase in Alloy of same composition as in Fig. 2, heated to 760 deg. C. and quenched. Magnified 700 diameters. Etched.

	Per Cent.
Copper	73.14
Zinc	21.73
Tin	5.13

Reference has already been made by the author to the results of pyrometric observations of the inversion-temperature at which the homogeneous β phase is transformed into eutectoid. This temperature was 560° C. on a cooling curve, and 595° C. on a heating curve.

In a cast alloy of the following composition:

	Per Cent.
Copper	70.0
Zinc	29.25
Tin	0.75

the eutectoid is plainly discernible in isolated patches (see photomicrograph Fig. 2).

In such an alloy, heated to 760° C. and quenched, the reversion of the eutectoid to homogeneous β occurs as shown by the dark-etching areas in micrograph Fig. 3. Lantern slides of micrographs 2 and 3 were shown by the author at the meeting at which his paper on the influence of tin and lead in brass was read, but it was then too late to allow of their incorporation in the paper. It was pointed out by the author that it was essential to anneal commercial 70/29/1 castings at a temperature of about 700° C., in order that the eutectoid might be changed to the homogeneous β phase, which, in its turn, would pass by diffusion into the α-crystals, whilst in the paper he advocated the thorough annealing of 70/29/1 castings before being subjected to mechanical treatment.

He has, since the reading of that paper, had occasion to examine a 70/29/1 tube-casting which cracked very badly during the drawing process. A portion of the casting which had not passed through the die, owing to rupture having taken place, was seamed with circumferential cracks. In photomicrograph Fig. 4 is shown the polished, unetched surface of a specimen from this portion, part of a transverse crack being clearly visible. In the vicinity of the crack, intercrystalline areas of eutectoid were to be seen, in some places being continuous with the crack (see Fig. 5), thus revealing their guilt as initiators of the disintegration; their presence was conclusive proof that the castings either had not been annealed at all, or had not been sufficiently annealed. A similar tube-casting which had been completely annealed was examined under the microscope, and its structure is shown in the photomicrograph Fig. 6. It will be seen that no intercrystalline eutectoid is visible, the temperature having been sufficiently high for its conversion to the β phase and for the complete diffusion of the latter into the α-crystals. No trouble was experienced in drawing the casting, in spite of its coarsely-crystalline character. The casting contained 71.61 per cent. copper and 1.03 per cent. tin.

The use of the pyrometer in annealing operations connected with the manufacture of wrought brass and other

*Paper read at recent meeting of Institute of Metals, London, England.
†Head of Metallurgical Department, Birmingham Technical School.
**"The Influence of Tin and Lead on the Microstructure of Brass," Journal of the Institute of Metals, No. 1, 1912, vol. vii. p. 201.
‡"On the Copper-rich Kalchoids," Journal of the Institute of Metals, No. 2, 1913, vol. x. pp. 235-265.

non-ferrous alloys has met with little encouragement amongst practical men. It may be difficult to understand the prejudice entertained by most manufacturers against the use of the pyrometer, but the probability is that even the best of instruments would fail to give, in inexperienced hands, the results expected of them. The Admiralty alloy instanced by the author affords a particularly good example of metals which require to be heated above a critical temperature in order to effect a necessary structural change.

The use in reliable hands of one of the many admirable and accurate pyrometers now available would ensure the attainment of the proper temperature, and hence eliminate incorrect temperature as one of the causes of failure.

In the case of Admiralty brass it is much more a question of temperature than of time; once the correct temperature has been reached the necessary structural change will take place rapidly, whereas no extension of the duration of annealing at a temperature below the critical temperature would produce the same results. A certain degree of softness might be obtained by the coalescence of the γ phase which would take place as a result of such treatment, but it is doubtful if its complete obliteration by absorption could be thus effected in practice.

In this connection it is interesting to observe how very much less soluble the tin-rich γ phase is in the α phase of the brasses when the latter is saturated with zinc. In an alloy of this type the author failed to effect solution of the γ phase by annealing a small piece for half an hour at 800° C.

The only result was a coarsening of the eutectoid structure, as shown in Fig. 7, the black spots representing particles of free lead present in the alloy, which has the following composition:

	Per Cent.
Copper	66.54
Zinc	32.14
Tin	0.78
Lead	0.54

Another case of a faulty tube has been brought to the

FIG. 4. Unannealed 70/29/1 Tube-Casting. Shows intercrystalline cracks caused by presence of eutectoid. Failed during drawing. Magnified 220 diameters. Unetched.

FIG 5. Same as Fig. 4. Shows presence of eutectoid continuous with cracks. Magnified 500 diameters. Unetched.

FIG. 6. Thoroughly Annealed Tube Casting (70/29/1) showing absence of eutectoid. Was drawn successfully. Magnified 100 diameters. Etched.

FIG. 7. Alloy containing Copper, 66.54 per cent.; Zinc, 32.14 per cent.; Tin, 0.78 per cent.; Lead, 0.54 per cent. Annealed half-an-hour at 800 deg. C. and slowly cooled. Shows coarse eutectoid and lead particles (black). Magnified 350 diameters. Etched.

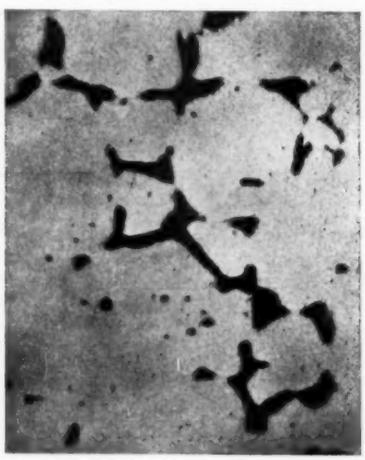


FIG. 8. "Burnt" Brass Tube containing Copper, 68.23 per cent.; Zinc, 31.25 per cent.; Tin, 0.08 per cent.; Lead, 0.28 per cent.; Iron, 0.16 per cent. Shows fissures. Magnified 150 diameters. Unetched.

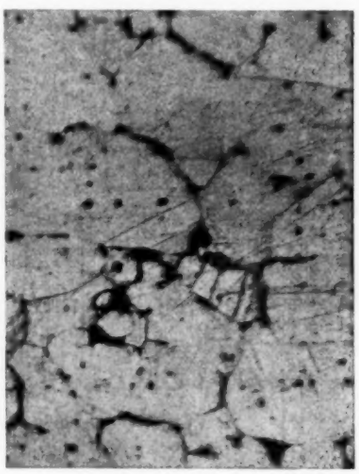


FIG. 9. Same as Fig. 8. Shows coincidence of fissures with intercrystalline boundaries. Magnified 150 diameters. Etched.

author's notice. The tube had been annealed after its third passage through the die, and an inspection of the surface revealed the presence of a number of scabs on the outside of the tube. These scabs, or blisters, were about 3/16 inch diameter, and their surfaces were slightly raised above the surface of the tube. After cutting out pieces of the tube containing the scab-like areas and polishing the surface, a microscopic examination revealed the presence of numerous intercrystalline fissures, presumably filled with metallic oxides, as shown in Fig. 8.

In an etched specimen the intercrystalline character of the fissures is plainly apparent (see Fig. 9).

It is assumed that the scabs were formed by contact with the flame in the annealing furnace—an old-fashioned inflame type—and that intense local heating occurred, attended possibly by incipient fusion of the brass in the locality and by intercrystalline oxidation. The analysis of the tube was as follows:

	Per Cent.
Copper	68.23
Zinc	31.25
Tin	0.08
Lead	0.28
Iron	0.16

Faults of this nature are very serious, as they frequently lead to rupture of the tubes during subsequent drawing operations. If rupture does not take place, the defective areas become closed up and temporarily concealed in the finished tube, and their presence, which must be anything but beneficial, may possibly afford an explanation of the mysterious pitting which so often occurs in condenser tubes. Moisture and saline, or other corrosive liquids, when the condensers are lying idle, would find harborage in the minute intercrystalline crevices, whence pitting of the worm-hole type might readily be initiated.

As to the frequency of occurrence of this type of defect in practice, and as to the possibility of its influence on corrosion, the views of manufacturers would be welcome.

The author invites replies to the following questions, viz.:

(1) Have such defects ever been encountered during the annealing of tubes in closed muffles? If so, an explanation other than that offered by the author must be found.

(2) Would it be advisable to institute a set of service corrosion tests in order to obtain a comparison between tubes which had been annealed during manufacture in furnaces of the inflame type and those which had been annealed in muffles of the closed type?

PROPER USE OF AMMETER AND VOLTMETER IN THE PLATING ROOM

A Brief Discussion as to the Function of Each Instrument.

By Explorer.

There has appeared in the pages of The Metal Industry a great deal of discussion as to the proper use of the voltmeter and ampere meter in the plating room. In the following is given the results and conclusions of experiments conducted to determine the correct use of these instruments. The function of these instruments must be borne in mind. The voltmeter measures the difference of potential or pressure

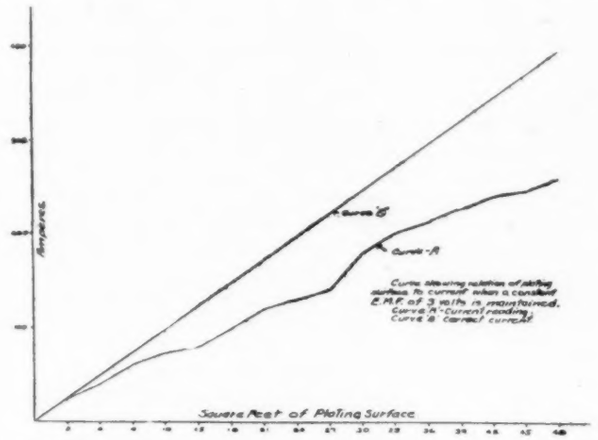


DIAGRAM SHOWING RELATION OF PLATING SURFACE TO CURRENT WHEN A CONSTANT E. M. F. OF 3 VOLTS IS USED.

at any desired point in the circuit; the ammeter, the current strength, or rate of flow of electricity in the circuit. As the amount of current determines the rate at which any metal is deposited, it is evident that what is actually desired is the proper number of amperes for the work being plated. There are two methods of obtaining the desired result:

(1) The first and most extensively used is for the plater to run his work at a certain voltage on each of his various solutions, the voltage used being determined as most satisfactory by observing results obtained with various voltages. This voltage, of course, is higher on some solutions than others.

(2) The second method is to determine by experiment the proper current density for the solutions under consideration. When this is determined, the area of the load of work is computed, as well as the time required, and proper current applied for the area to be plated.

The following experiment was conducted to determine if the first method given is correct and how far it may be followed with constant results. A load of work consisting of approximately 48 square feet was divided into sixteen bundles of 3 square feet each. The first bundle was placed in the tank and the voltage set at 3. The current read 25 amperes. This being one-sixteenth of the total load, all the work (48 square feet) should take sixteen times this amount, or 400 amperes, keeping the voltage at 3. The following is what was actually obtained. The solution used was a nickel electrolyte.

1 bundle — 3 square feet—3 volts— 25 amperes
2 bundles— 6 square feet—3 volts— 40 amperes
3 bundles— 9 square feet—3 volts— 60 amperes
4 bundles—12 square feet—3 volts— 72 amperes
5 bundles—15 square feet—3 volts— 82 amperes
6 bundles—18 square feet—3 volts—100 amperes
7 bundles—21 square feet—3 volts—120 amperes
8 bundles—24 square feet—3 volts—128 amperes
9 bundles—27 square feet—3 volts—140 amperes
10 bundles—30 square feet—3 volts—175 amperes
11 bundles—33 square feet—3 volts—200 amperes
12 bundles—36 square feet—3 volts—212 amperes
13 bundles—39 square feet—3 volts—225 amperes
14 bundles—42 square feet—3 volts—235 amperes
15 bundles—45 square feet—3 volts—240 amperes
16 bundles—48 square feet—3 volts—253 amperes

The difference between the correct current for the work and that obtained by using a constant voltage is shown by curves in the accompanying sketch. This shows that while a proper current may be obtained for a small load of work, a large load would receive much less than should be used—in the case shown above only 63 per cent. of the proper amount.

The constant voltage method of obtaining the proper current would be satisfactory if the only resistance in the circuit was that of the solution. This is not the case however; the resistance of the parts in contact with the wire or rack from which it is hung, and the contact with the cathode rod, are the highest resistances in the circuit, and as the resistance of these contacts varies, the constant voltage method of current regulation is unreliable.

In a plating room where any amount of the same work is plated, the proper method of using the ammeter and voltmeter is to determine by experiment the proper number of amperes per square foot of plated surface. This is best accomplished by taking small bundles of work of the same known area and starting at a low current density, say, two amperes per square foot, and plate each bundle, increasing the current one ampere per square foot each load until the deposit becomes porous ("burns"). Examine the parts plated and determine which deposit is most satisfactory. This may be the work plated just before "burning" was noted. In this manner the proper current density is determined for each solution. When a load of work is to be plated the area is figured and the number of amperes to be used determined from the current density previously settled upon as most suitable.

In small plating rooms, where very little of the same class of work is plated, and in job shops where constantly varying loads of work are being plated, the voltmeter is the proper instrument to follow. It should be borne in mind, however, that a higher voltage is needed for a large load of work than for a smaller one, as in the former case there is more loss of current and consequently a higher resistance. The foregoing does not cover special cases such as the striking up of silver work. but covers the more common solutions of nickel, copper, zinc, etc.

THE CONTROL OF BRASS AND COPPER PLATING SOLUTIONS

A Few Suggestions for Meeting the Difficulties Commonly Encountered by the Plater.

By A. D. Cowperthwait.*

Cyanide brass and copper plating solutions are perhaps the most common ones found in the plating room, yet brass in particular is the most troublesome and least understood of any solution used. The difficulties it presents to the plater are varied and many, and it is sometimes no easy matter to ascertain the cause of the trouble, especially if the plater has no way of determining the metal content and cyanide of his solution. He has no alternative but to try one remedy and, failing, to try another until he at last hits upon the right one. This is a costly and time taking process which is hardly the fault of the plater if he is without access to chemical assistance, for even the most experienced brass plater cannot always tell the source of his trouble simply by the looks of his solution. Careful observation of brass solutions in use in mechanical platers have led to the following conclusions: These solutions are 1,600 gallons each, work continuously going in and out of them ten hours each day; the voltage used, measured across the tank when full of work, is from 4.0 to 4.5 volts; the amperage of course varying from time to time with the cathode surface, temperature, etc.

It is endeavored to keep the total metal content of the solution at about 5.0-5.5 ounces per gallon, and in the ratio of 80 per cent. copper and 20 per cent. zinc, with the free cyanide about ¼ ounce per gallon higher than the copper content. This will keep the anodes bright and in a state to dissolve readily. Sufficient aqueous ammonia is added from time to time to keep the color of the deposit bright. This should be used cautiously as an excess causes the anodes to coat over and prevents them from feeding properly. An approach of this condition may be noticed by the anode becoming coated on the side toward the tank, while the side toward the work is clean. The temperature of the solution plays a very important part in its behavior and should be kept about 80 degs. Fahrenheit for best results with the above metal content. Brass solutions cause considerable trouble at times by "streaking" and plating red. The streaking is usually caused by a low metal content and this is easily revealed by analysis. The cause of the red tinge which it sometimes assumes is not always so easily discovered as any of the following things may be the cause:

High copper with a low cyanide content.

High zinc and a high cyanide content.

Solution too hot, or a short circuit in the tank, which is the equivalent of a low voltage across the solution.

It seems rather peculiar at first thought to say that either high copper or high zinc may cause redness. With high copper it is self-evident, the copper ions being in excess and a low cyanide assisting dissociation of the complex copper salt, namely, copper potassium cyanide. But with high zinc content the cause for redness is rather baffling. To begin with, the high cyanide seems to be necessary to hold the zinc in solution as it approaches the saturation point.

This high cyanide prevents or rather hinders the dissociation of the zinc salt which must take place before the zinc can deposit. This same applies to the dissociation of the copper salt but being in excess does not seem to be affected as rapidly as the zinc salt, hence the deposit is red. An increase in cyanide over this will prevent any dissociation of the complex metal salts and no deposition of metal will take place, even though the solution seems to be working hard. This state will continue until the current has decomposed enough of the free cyanide to allow a slight deposition of metal. Such a condition should be overcome by removing part of the solution to a barrel and stirring in as much metallic salts as it will entirely dissolve. Do not add dry salts to the solution in the tank. The question of temperature is a very important one. The solution can be run successfully at almost any temperature chosen but the essential part is to keep the same temperature the year around. From 75 degs. to 85 degs. Fahrenheit is a temperature most easily attained, for with the usual amount of working it will not rise above this in the summer months, and a very little steam in cold weather will keep it there.

*Chemical engineer American Hardware Corporation, New Britain, Conn.

The importance of this can be seen from the following experience. Upon boiling a small brass solution to drive off an excess of ammonia present I happened to put in some work before the solution was cool and obtained a bright copper deposit. After standing over night in a cold room the solution dropped to about 50 degs. Fahrenheit. Work plated in it came out looking as if it had been galvanized. By warming to 80 degs. Fahrenheit a good bright brass color was obtained. This simply emphasizes the importance of temperature control where a uniform color is demanded from day to day. The explanation of this is that the temperature coefficient of the copper salt is greater than that of the zinc salt, hence with a rise in temperature the velocity of the copper ions in the solution increases faster than the velocity of the zinc ions, and therefore, the ratio of the copper deposited to the zinc deposited is greater than at the lower temperature. This means a redder deposit. Conversely if the temperature be lowered the ratio of the copper deposited to the zinc deposited is less, hence a whiter deposit is obtained.

A great many brass platers use arsenic in their solutions as a brightener. This has been given a thorough tryout and it was decided to abandon the use of it on account of its uncertain behavior. A very small excess causes the anodes to coat over and leads the plater to the belief that he is low in cyanide when he may be just the reverse. Often in attempts to keep the work very bright the plater will get in an overdose of arsenic and the result is a black plate at once, which must be plated out by running anodes through the solution.

Brass solutions during the first few cold weeks are apt to cover over with a layer of crystals. This is very apt to happen on heavy solutions where the temperature is allowed to drop much below normal. These crystals are a complex zinc salt with the formula $K_2 Zn (Cn)_4 . 3 H_2O$. They are caused by the solution falling below the saturation point and the common mistake is to add more cyanide to redissolve it. This makes matters worse by throwing down still more of the zinc salt. The only remedy is to warm the solution, or to skim off the crystals and dissolve them in a pail of hot water.

THE COPPER SOLUTION.

A cyanide copper solution offers very few difficulties to the plater compared to a brass solution. However, there are mighty few copper solutions run at their highest efficiency. By this I mean without the use of any metallic salts. If the free cyanide of the solution be properly controlled and it is a simple matter, the solution can be fed entirely from the anodes. I have under my observation two solutions of about 1,600 gallons each which are worked hard every day. One of these solutions has run for eleven months to date and the other for six months without the addition of any metallic salt whatever. In fact, on one or two occasions the metal content has been allowed to get so high that some of the solution was taken out and used in a brass bath and the tank refilled with water. These solutions are run at 80 degs. to 90 degs. Fahrenheit. For ordinary running conditions the cyanide content is kept just a trifle higher than the metal content.

If the metal does not feed fast enough, we raise the cyanide and vice versa. About four ounces of copper to the gallon is found to give the best results. A little borax in the solution from time to time keeps the deposit bright. The solution should be analyzed for copper and cyanide every week or ten days if possible. The plater in the meantime can control it very well by watching his deposit. Very low cyanide is evidenced by the appearance of small blisters on polished work and a red coating on the anodes even before this. Too high cyanide is evidenced by a hard plate, and failure of the work to cover rapidly when first suspended in the solution. Electrolytic copper anodes are cheapest and best for this work. They are obtained in long strips about sixteen inches wide and may be cut into the desired lengths. For brass solutions the wrought anodes give best results, as they are more uniform in structure and eat off more evenly, causing less waste; 80 per cent. copper and 20 per cent. zinc have given best results. Cast anodes may be used, but not apt to run so uniformly either in composition or structure. They are apt to eat away in the center and to pit, due probably to the manner of casting. These of which I speak were cast in iron molds and the edges cooled more rapidly than the center, causing a difference in the size of the crystals. Those cooling more slowly being larger and more easily attacked by the cyanide, thus causing the anodes to eat away unevenly.

METHOD OF ANALYSIS.

A very simple method of analysis for these solutions may be made as follows: 10 c.c. of the solution is pipetted into a 600 c.c. beaker and diluted to about 250 c.c. A weighed platinum gauze is inserted for a cathode and a platinum spiral rotated by a small motor used for the anode. A lamp board may be connected in series with this for use on a 110 volt circuit. Use about 8 amperes and 15 volts with the motor rotating at about 500 r. p. m.

Both copper and zinc will be deposited in half to three-quarters of an hour. Weigh this. Dissolve into another 600 c.c. beaker with 10 c.c. nitric acid. Dilute to 250 c.c., neutralize with ammonia and add 2 c.c. concentrated nitric acid. Electrolyze with about 4 amperes and 6 volts. The copper is deposited. Weigh and obtain zinc by difference. Multiply the weight of copper and zinc by 13.4 to obtain ounces per gallon. The copper solution is run in a similar manner except that it is not necessary to redissolve, no zinc being present.

For free cyanide place 10 c.c. in a small Erlenmeyer flask, dilute to about 40 c.c. and titrate with 1/10 normal silver nitrate solution from a burette.

Multiply the number of cubic centimeters of silver solution by 0.174 to obtain ounces per gallon.

This method is not strictly accurate, due to the dissociation of the complex copper and zinc cyanides, but the error involved is of little importance for this work.

COPPER SITUATION IN JAPAN.

The condition of the copper market is worse than ever, with no prospect of relief. Latest press quotations for electrolytic copper are 29.50 yen per picul ($11 United States gold per 100 pounds) and 98 per cent. quality at about 28 yen ($10.46 per 100 pounds), but these quotations are nominal as there are no buyers. The leading mine owners have hitherto exported their output, the home market being supplied by the smaller mines. The suspension of exports, however, has confined the large operators to the home market, which they have congested with enormous stocks. In the consequent slump the price has fallen so low that it does not cover cost of production. A proposal is therefore afoot among mine owners to cease smelting until the congestion is relieved.

EDITORIAL

OLD SERIES Vol. 21. No. 2.

NEW YORK, FEBRUARY, 1915.

NEW SERIES Vol. 13. No. 2.

THE METAL INDUSTRY

With Which are Incorporated
THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER, THE ELECTRO-PLATERS' REVIEW, COPPER AND BRASS.

Published Monthly by
THE METAL INDUSTRY PUBLISHING COMPANY (Incorporated)

PALMER H. LANGDON - President and Treasurer
FREDERICK F. BURGIN - Vice-President
JOHN B. WOODWARD - Secretary

COPYRIGHT, 1915, BY THE METAL INDUSTRY PUBLISHING COMPANY

Entered February 10, 1903, at New York, N. Y., as second class matter under Act of Congress March 3, 1879

SUBSCRIPTION PRICE, $1.00 PER YEAR, POSTPAID TO ANY PART OF THE WORLD. :: SINGLE COPIES, 10 CENTS
Please Remit by Check or Money Order: Cash Should Be Registered

ADVERTISING RATES ON APPLICATION
FORMS CLOSE THE FIRST OF THE MONTH

PALMER H. LANGDON - Editor and Publisher
LOUIS J. KROM - Managing Editor
GEORGE W. COOPER - Advertising Manager
THOMAS A. TRUMBOUR - Circulation Manager

ADDRESS ALL CORRESPONDENCE TO
THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK
TELEPHONE NUMBER, JOHN 689 CABLE ADDRESS, METALUSTRY

CONTENTS

PAGE.

Bronze in History-Making ... 51
The Crucible Business (Continued) ... 54
Small Aluminum Tubes ... 55
Some Methods Used by Platers to Produce Bright Nickel Deposits ... 57
Japanning, Its Origin and Development ... 58
Brass Foundry Equipment and Management (Continued) ... 61
Die Castings ... 62
Snap Flasks ... 64
A Note on the Annealing of Brass ... 65
Proper Use of Ammeter and Voltmeter in the Plating Room ... 67
The Control of Brass and Copper Plating Solutions ... 68

Editorial:
Metals in War Time ... 70

Correspondence:
The Voltmeter and Ammeter in Plating Room ... 71
Standardization ... 72
Failure of Brass and Bronze ... 72
A Flash from the Field ... 72

New Books:
Raw Materials of the Enamel Industry ... 72
Henley's Twentieth Century Home and Workshop Formulas ... 72
American Society for Testing Materials ... 72

Shop Problems ... 73
Patents ... 75

Equipment:
Complete Workshop ... 77
Metal Melting Furnace ... 77
30 Ton Hydraulic Pipe Bender ... 78
So-Luminum, a New Aluminum Solder ... 78
New Eureka Sprayers ... 79
Long Stroke Heavy Drawing Press ... 79
New Polishing Lathe ... 79
Soldering Copper Handle ... 79

Associations and Societies ... 80
Personals ... 81
Panama-Pacific International Exposition ... 82
Trade News ... 83
Metal Market Review ... 90
Metal Prices ... 91

METALS IN WAR TIME

COPPER

The recent announcement that the Copper Producers' Association had voted to dissolve and publish no more figures of copper production in the United States was no surprise to those who were at all acquainted with copper trade conditions. The wonder has been that the association, which was formed in 1909, has kept together as long as it has. Like all good things it served its purpose for a while, and as is inevitable its good offices were taken advantage of. The figures published each month showing the production, consumption (consisting of exports and domestic requirements) and amount of copper on hand, has been very valuable to the consumer. Advantage has been taken, however, of these figures and some users have benefited by "working the market," and this has, in some cases, caused embarrassment to the producers. Consumers have made certain deductions from the amount of copper on hand, and when stocks were high, stayed out of the market in the hope that large accumulations would force down the prices. It is to stop all this that the association has been dissolved and the figures abandoned.

The action taken is unfortunate, as it tends to throw the entire metal trade in the fog of doubt and uncertainty that existed before 1909. With no figures, opportunity is offered for speculation by parties who are not interested directly in the consumption of copper, and this is likely to cause trouble for the legitimate consumer. On the other hand consumers may, in the light of rumors of changes in price and amount of production, refrain from buying and be caught in a squeeze and cause the price to rise against them by their own efforts to meet their requirements. The reverse of these conditions may even be true and over-buying on the belief of a rising market may result.

Regarding reports in the daily press that Germany is looking for substitutes for copper so that she, as a country, may cease to be a customer of the United States, we do not think they need be taken seriously. Copper has had, since the earliest days of which we have knowledge, a place of its own, and we doubt if there ever will be any suitable substitutes discovered. In the early days of aluminum great predictions were made as to how it would displace copper, but these predictions were never completely fulfilled. There is a place for both metals and their consumption has grown together. There need be no anxiety felt that Germany will not take copper from the United States just as soon as she can get it through the channels now closed. The needs of a nation of 65,000,000 people as regards copper are not going

to be curtailed by a few who may have an idea that other things may be used in its place.

Germany has in the past five years imported at least 200,000 tons of copper per year, which, however, has been largely in excess of her own immediate consumption. The war will, of course, greatly deplete these stocks and she will need more than ever at its close, so there is a good prospect of a foreign market for some time to come. This should, therefore, stimulate our production in the future and put the copper mining industry on a firm basis, for if we have to leave the metal in the ground for the present, we at least know where it is!

ZINC

The present high price of sheet zinc and spelter is due to a number of causes. The explanation may be said to be comparatively easy. Stocks at the close of 1914 were not sufficiently large to withstand the large demand made during January, both foreign and domestic, and consequently up went the price. Large inquiries from abroad for sheet metal caused those smelters who have the facilities, to withdraw quotations on the cast metal from the market and devote their energies to the production of sheet and strip. Over-anxiety on the part of the large consumers here, those who use the metal for brass manufacture, caused the price to go up out of all bounds on spelter. Ordinary brands run now from 8 cents per pound to 9 cents, with "brass special" at 10 cents, while fancy brands go as high as 16 cents. The brass mills, of course, have been and are busy on war materials in which spelter plays an important part, and this is one of the contributing causes of the increased demand. Other reasons for the present flurry, which, it is hoped, we may call the sudden rise, are the large demand for zinc powder, which heretofore has not been a staple article of manufacture in the United States, and the increased call for sheet and manufactured products.

We do not think that there is any cause for worry over the reports that there has been a corner in zinc, for had this been the case the high price of 8 cents would certainly have disclosed the fact of hidden stocks. The large producers simply say that they are "sold out," and there is every reason to believe that this is so. The only result now that can be expected to help matters is for consumers to stop bidding against themselvees and allow producers to increase their facilities by working to fullest capacity. As a matter of fact, we believe that if consumers would withdraw from the market for a short time, the price would drop and if they could not get all they wanted they could at least get the same amount as is available at higher prices. Perhaps the present condition of things will encourage owners of properties heretofore considered low-grade to develop them and thus add to the already increasing production.

CORRESPONDENCE

WE CORDIALLY INVITE READERS' OPINIONS AND CRITICISMS OF ARTICLES PUBLISHED IN THE METAL INDUSTRY

THE VOLTMETER AND AMMETER IN THE PLATING ROOM

To the Editor of The Metal Industry:

The voltmeter and ammeter in connection with the operation of plating solutions are coming more and more into practical use, as they are of inestimable value to every plater. By the proper use of these instruments the plater always has a correct knowledge of what is taking place in his solutions, particularly if each tank is provided with a volt and ammeter. If he has a fair knowledge of the number of square feet of work surface in any solution at any time he can determine immediately if he is getting the proper amount of deposit on his work by the readings on the ammeter. They also serve as a check on his solutions when not registering the proper amount of current passing through his resolutions with the given amount of work surface in the bath.

With the voltmeter and ammeter applied to each solution and in a position where they are easily read, they are a great aid to the plater in making the proper adjustments of current with the rheostats. Heretofore it has been customary to place the voltmeter and ammeter near the dynamo, and frequently the voltmeter only connected to the dynamo mains, which would only indicate the pressure the dynamo was generating. It is not as essential to know this as to know the voltage across each solution. In like manner the ammeter has only been used to show the number of amperes the dynamo was delivering. With the instruments connected in this manner the information obtained is of no practical value to the plater, as it only indicates what the dynamo is doing.

With the voltmeter and ammeter on each bath the plater can determine instantly if he is getting the proper amount of current through his solutions. They can also be used to check up any of the solutions at any time with a very simple test.

First secure a piece of sheet metal, say 12 in. x 12 in. x 1/32 or 1/16 in. thick, which would give approximately two square feet of work surface. Hang this in the solution, being careful that the distance between anode surface and work surface are the same on both sides. Then make a careful record of volt meter readings, also the ammeter readings. By keeping this record the same test can be applied after the solution has been worked for some time. If the readings are not the same as before, the solution has changed and requires some replenishing to bring it up to condition that it was when making the previous test. I would suggest making these tests in a small vessel of some kind and which can be used for testing various solutions.

With these instruments connected to each solution the plater can turn out his work in a scientific manner, absolutely knowing the amount of deposit of metal on the work and oftimes avoiding the return of unsatisfactory work on account of insufficient deposit.

Why not work in a scientific manner by having a complete knowledge of just what you are doing at all times, thereby bringing your department up to the highest efficiency and turning out work at a minimum cost.

Chicago, Ill., January 20, 1915. S. E. Huenerfauth.

STANDARDIZATION

To the Editor of THE METAL INDUSTRY:

Much has been written during the past year regarding the management of the different plating baths, such as copper, brass, nickel, silver and gold, and a great many conflicting methods seem to be used by different platers with seemingly good success. I have read these different articles with interest as a practical plater, and have derived a great deal of good help from them, but I am sorry for the man who has had as much experience as some of us have had and who reads these articles expecting to get help for the solution of some of his problems. If he should try everything that is written he would certainly be at sea instead of being able to arrive at a definite solution.

One plater recommends and states that he uses acid for a nickel solution that pits, another uses sal ammoniac, another uses arsenic, and still others use carbonate of nickel, boracic acid, salt, ammonia, ammonium chloride, and so on, and all claim to have success. Now, some one of these are wrong or else they have an illusion of some kind, for one can readily see that many of these different chemicals have opposite action in solution. What is really needed more than anything else at this time in the way of real help to all platers is the standardizing of all plating solutions, similar to the Electrical Engineers' Association has in its wiring, etc.

The American Electro-Platers' Society will, I believe, eventually bring this about when the society becomes strong enough to do so, as everything seems to point that way, and it only means a matter of time when we shall have a standard to work by in the plating industry. In the meantime I would suggest that all platers who are interested in the welfare of their profession help along this line, and the best way to do that at the present time is to become a member of the American Electro-Platers' Society. I believe that it will be through this society that the standardizing of solutions will come, and the sooner the better.

I know some of the manufacturers have an idea that this society is a union of platers, but it is not, only that we are united in the one effort to give and get all the knowledge possible regarding our profession, and of course it is naturally to be expected that by gaining more knowledge of the profession we will become more efficient and of greater value to our employers. In this way earning more for the employers, and consequently be worth more to him. It is a poor employer who will not encourage his plating foreman to become more efficient in his department, as that seems to be the need in every department of a manufacturing concern. I have also heard platers who have attended some of the meetings of the American Electro-Platers' Society and who have not been interested enough to become a member say that they did not see why we had the supply salesman in our society. Now, the supply salesmen who belong to the society are mostly all platers and they are not active members, but associate. They give us a great deal of help and receive a certain amount in return. I have yet to see or hear of the plater who has not at some time or other been helped out of some perplexing problem by the supply house salesmen, and some of them have been helped to a position when out of work, or the manufacturer who has not obtained the services of a good foreman when in need of one. The supply houses and their salesmen belong with the platers.

I did not intend to go into this society matter to such a large extent, but I cannot help seeing the benefit derived by both the manufacturer and the plater, and I trust that this will also help some one else to see it in the same light.

T. C. EICHSTADT.

Detroit, Mich.

FAILURE OF BRASSES AND BRONZES

TO THE EDITOR OF THE METAL INDUSTRY:

In reply to your letter of January 21, I would state that I have just received a request from Mr. J. L. Jones to participate in the discussion of the same subject, "Failure of Bronzes and Brasses," before the American Institute of Metals meeting at Atlantic City, next September, and have accepted his invitation. At the Bureau of Standards we are carrying out some experiments on the behavior of these materials, particularly with reference to internal stresses set up under different conditions of manufacture. I do not feel ready to report any results for publication at the present time, but I may say that from our examination of material and from what we have been able to gather from the experience of others, it looks probable that those bronzes and brasses which have been used in engineering construction to replace steel may be put into a condition in which they will hold their mechanical properties without breaking down, due to season cracking and other causes.

We are also concerning ourselves with the determination of reasonable specifications for some of these materials. In this work we have asked the co-operation of a considerable number of manufacturers, and in some quarters have met with ready response. It is obvious from the experiences which have been related in THE METAL INDUSTRY and elsewhere that it is highly desirable to reach definite conclusions as to the quality, suitable specifications and methods of manufacture of the bronzes and brasses used in engineering construction.

GEORGE K. BURGESS,
Chief, Division of Metallurgy,
Washington, D. C., January 25, 1915. Bureau of Standards.

A FLASH FROM THE FIELD

TO THE EDITOR OF THE METAL INDUSTRY:

We beg to thank you for the replies published in the current issue of THE METAL INDUSTRY. They have set us straight on several points, and we are sure they will be of great assistance to others in the plating industry.

J. W. YORK & SONS,
FRANCIS CAMPBELL.

Grand Rapids, Mich., January 28, 1915.

NEW BOOKS

RAW MATERIALS OF THE ENAMEL INDUSTRY.—By Julius Grünwald, translated by Herbert H. Hodgson. Size 6½ by 9 inches. 255 pages, including index. Several illustrations. Bound in cloth. Published by J. B. Lippincott Company. Price $2.75. For sale by THE METAL INDUSTRY.

This work should be welcomed with a great deal of enthusiasm, as the technical literature so far available dealing with the subject of enameling is very meagre, and although in recent years gratifying progress has been recorded, nevertheless many problems concerning enamel manufacture still await a solution. Every man engaged in practice realizes the desire for more extensive knowledge, and is aware of the ignorance existing in certain circles of non-chemically trained enamel managers to observe facts and their explanation. Through this work Dr. Grünwald has endeavored to render the industry a service and a careful perusal of the book will convey the impression that he has fully carried out his desires. The book is a very worthy companion to the previous treatise on the "Theory and Practice of Enameling on Iron and Steel."

Since almost all the raw materials for enameling purposes also find analogous employment in purely ceramic industries the book may find a special interest there as a work of reference.

HENLEY'S TWENTIETH CENTURY HOME AND WORKSHOP FORMULAS, RECIPES AND PROCESSES.—Edited by Gardner D. Hiscox, M. E. 1914 edition revised and enlarged. Size 6½ by 9 inches. 808 pages with index. Bound in cloth. Published by the Norman Henley Publishing Company. Price $3. For sale by THE METAL INDUSTRY.

This book is the revised edition of the Henley well-known Twentieth Century Receipt Book and contains ten thousand selected household and workshop formulas, recipes, processes and money-saving methods for the practical use of manufacturers, mechanics, housekeepers and home workers.

AMERICAN SOCIETY FOR TESTING MATERIALS—Year Book.—Edited by Edgar Marburg, secretary and treasurer. Size 6½ by 9 inches. Bound in cloth. 500 pages. Numerous illustrations. Published by the Society.

This book is the regular year book of the society and contains general information concerning the institute and also a list of the standard specifications adopted by the society during the past year. The work is distributed to members of the society.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

ALLOYING

Q.—Kindly inform me what is the hardest and most elastic alloy of 16 and 18 karat gold. Does the addition of platinum add much to their elasticity and what amount should be used? I wish to obtain a metal that will not anneal soft and lose its resiliency.

A.—Platinum, especially if it contains iridium, has a marked tendency to separate from gold alloys and hence these alloys have little industrial use. The gold-iron alloys are hard, but malleable. They have been used for jewelry making in France and might serve your purpose—J. L. J. Problem 2,093.

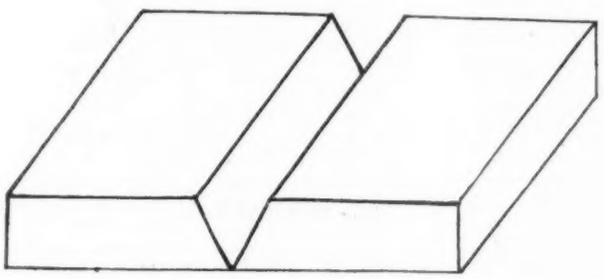
BURNING

Q.—I have a number of aluminum castings, such as crank casings for automobiles, to burn, and should like to know of the best way of doing this work. Should I use a flux of any kind? I am familiar with the method of preparing the castings for burning but do not know what flux to use.

A.—If it is possible to have a portable sand blast, a good method is to sand blast the parts that are to be burned in, while your castings are lying bedded in the sand prepared for burning. Then with moderate care in melting the aluminum you use for burning you should have no trouble in making a good union.—K. Problem 2,094.

Q.—We wish to lead line a tank to hold acid. Kindly advise us how to burn lead seams. If a flux is used, what kind?

A.—No flux is used when burning a lead seam on an acid tank. The sheets of lead are placed in position and where the edges come together a V-shaped groove is formed as shown in cut: care being taken that the surface of the lead is scraped clean,



then a strip of lead is held in one hand by the operator while he manipulated the nozzle of a hydrogen blow pipe with the other. The lead from the strip is then melted and this fills up the V-shaped ditch. No particular skill is required except in the burning of the vertical sides of the tank. This part of the job is usually accomplished by beginning at the bottom and going up, care being taken to let each addition of melted lead set before going on and this insures a smooth job. While there are concerns that we believe furnish apparatus for generating the hydrogen, any plant that has a first class plumber in its employ can make up its own apparatus for generating this gas.—K. Problem 2,095.

CHEMICAL

Q.—I would appreciate it very much if you can advise me the best possible way of finding out the amount of silver chloride in a one hundred-gallon tank.

A.—Probably the simplest method for determining the chloride of silver content in any given quantity of silver solution is as follows:

First—Measure accurately or weigh 8 fluid ounces of the solution, then dilute with an equal quantity of cold water.

Second—Precipitate the silver as a chloride from the solution by adding muriatic acid in excess. If the solution is only slightly acidulated with the acid, the silver will be precipitated as a silver cyanide, but with an excess, the silver will be precipitated as a chloride.

Third—Syphon the clear liquid from the chloride of silver residue very carefully and then place upon filter paper arranged in a glass funnel. Now wash the precipitate with warm water several times or until all trace of the acid is removed.

Fourth—Now remove the silver chloride from the filter paper and place on a small porcelain dish and evaporate until dry by the aid of heat upon a water or sand bath.

Fifth—When the silver chloride is perfectly dry and cool, weigh it carefully and sixteen times the weight of the precipitate will give you the amount of silver chloride per gallon of solution. As silver chloride contains 70 per cent. of silver and 30 per cent. of chlorine, one Troy ounce of silver chloride will contain seven-tenths of an ounce of pure metallic silver, 336 grains, Troy weight.—C. H. P. Problem 2,096.

CLEANING

Q.—In our manufacturing machines we have large discs that we have to take out every day to put machine work on them and which are covered, when they come out of the machines, with oil and emery. Can you tell us of any liquid we could use in a tank that we could dip these into to clean them off, other than using benzine, hot sal soda or potash. We wish to use a cleaning material but prefer not to use material that we have to heat up and dislike using benzine or gasoline on account of the fire risk.

A.—The only materials we can recommend as substitutes for benzine or gasoline are carbon tetra-chloride or trichlo-ethylene. These are perfect saponifiers of grease or oil and yet are absolutely non-inflammable. They are a little more expensive than benzine or gasoline, but will do more work than either of these substances. To avoid excessive evaporation or either of these materials they should be held in air tight tanks when not in use, that is, the covers should be made so that they can be closed air tight.—C. H. P. Problem 2,097.

DIPPING

Q.—Please inform me what is the best dip to use in place of lacquer on cheap brass and copper plated goods in order to prevent them from tarnishing.

A.—One of the very cheapest methods to use in the place of lacquer is to prepare a resin varnish from common resin and benzine. About eight ounces of common resin dissolved in a gallon of benzine will answer the purpose.

Another method is to dissolve white glue in hot water to which is added 1 per cent. of formaldehyde.—C. H. P. Problem 2,098.

FINISHING

Q.—Will you kindly let me know how to make the finish known as the burnt brass finish on gas and electric fixtures?

A.—We would refer you to the article by Royal F. Clark, entitled "Production of the Clouded Brass or Copper Finish Upon Art Metal Lamps," which appeared in the February, 1911, issue of THE METAL INDUSTRY.—C. H. P. Problem 2,099.

FINISHING

Q.—How can we obtain a French gray or smoke finish on aluminum?

A.—The smoke finish upon aluminum or other metals is produced by the aid of a gas flame. The best method to pursue is as follows: Lacquer the articles with a gum lacquer or a lacquer that contains a fair percentage of gum so that under the influence of re-heating the lacquer becomes resilient. After the lacquer is applied and becomes cool the articles are handled with suitable frames made from iron wire so they can be handled from the inside, when possible, to avoid finger marks caused by the softening of the lacquer.

A permanent gas flame should then be arranged with a protection from draughts by a glass or wooden frame extending on each side and at the rear of the flame. The flame should not be too strong so as to avoid the excess of air pressure. The idea is to produce a flame that will yield as much smoke as possible. The lacquered articles are manipulated over the flame so that a mere shading or an intense black color can be applied, depending upon the operator. After the smoke black is produced the articles are allowed to cool and should then be wiped with boiled linseed oil or immersed in a warm solution of the oil. The idea of this is to give a lustre to the smoke black impregnated in the lacquer without affecting or reducing the same. Some operators apply the smoke black previous to lacquering and then dip in the lacquer afterwards. Unless extreme care is used in lacquering afterwards the black coating will be removed by the lacquer.—C. H. P. Problem 2,100.

MACHINING

Q.—Kindly send us a formula for a solution which, in your opinion, can be used on gear cutting machines and the like. I have in mind such a substance as "soluble oil" which when added to water will immediately turn white and form a fine emulsion. Would also like to know of a method that could be used to prevent the rusting of machined surfaces of such articles as push rods, cam shafts, crank shafts, etc.

A.—Probably one of the best formulas for your purpose consists of the following materials:

Water	10 gallons
Neutral black soap	5 pounds
Lard oil	1 gallon

To prepare the solution dissolve the soap in the water by the aid of heat and then add the lard oil and re-heat until the oil is thoroughly incorporated in the mixture. Other materials that may be used are water, 10 gallons and 5 pounds of soda ash and sufficient lard oil to produce a soap emulsion and Oakite. The latter material can be used direct by dissolving in hot water or as an emulsion with lard oil or soap chips.

To prevent the rusting of machined steel surfaces maintain a hot lime water solution of 4 to 6 ounces of common lime per gallon or water. Use the solution at the boiling point and immerse the articles in it for a few seconds; then remove and let dry spontaneously. The lime will prevent them from rusting. A hot bath of boiled linseed oil may also be used. Immerse the articles in the hot oil and then let them drain as free from the oil as possible.—C. H. P. Problem 2,101.

MELTING

Q.—We have a quantity of aluminum ingot into which a small percentage of iron is embodied. Please advise us how the iron can be eliminated so that the aluminum can be used in casting?

A.—If the amount of iron in your ingot is, say, over 2 per cent., we would advise that the best plan would be to sell the metal to a concern that could smelt it. But if it does not contain over the amount specified above we should think you could use a small amount of it mixed in with new metal and that the iron would be so diluted that it would have no effect on casting. In fact, iron that is well incorporated in aluminum up to 1 per cent. has been found to have a strengthening effect.—K. Problem 2,102.

MIXING

Q.—We would like to know of a good cheap metal mixture for making ferrules that are used by plumbers. The competition on this class of goods is very close.

A.—A very good composition for ferrules is made up of the following:

Copper	52	Pounds
Zinc	41.10	"
Lead	6	"
Aluminum	.6	"

This is a good fluid mixture and you will have no trouble running any of the different sizes.—P. W. B. Problem 2,103.

PLATING

Q.—I am nickel plating zinc parts of graphophones and I use the following solution:

Nickel sulphate	10 ozs.
Salammoniac	8 ozs.
Potassium citrate	14 ozs.

The results are not white enough. Can you help me out?

A.—Your solution is probably alkaline. Test out with red litmus paper. If the paper shows a faint bluish tinge the solution should be neutralized. To accomplish this dissolve citric acid in hot water, then add sufficiently to the bath so that the red litmus paper does not change.

For nickel plating zinc in a solution according to your formula the solution should always be neutral to get the best results.—C. H. P. Problem 2,104.

Q.—I recently bought twenty-four nickel anodes 8 x 16 x ½ inches and before they had hardly begun to show being used, some of them became like rubber and they could be bent in almost a circle. I went on using them and they nearly all became the same way and would tear in two from their own weight and drop to the bottom of the tank, although after being analyzed the chemist claimed they showed 92 per cent. nickel.

A.—When your nickel anodes have reached the condition you state the metal is pretty well used up leaving nothing but carbon behind. The carbon being used in the form of graphite in the casting of the anodes. The analysis of the anodes might be correct as far as the purity of the nickel still contained in the anode is concerned, but the point to determine is how much nickel still remains in weight combined with the carbon left in your anodes. Usually when nickel anodes reach the point stated they contain less than 10 per cent. by weight of metal.—C. H. P. Problem 2,105.

POLISHING

Q.—Can you kindly give us a little information as to how to use Vienna lime for polishing steel?

A.—Vienna lime is used in the form of a composition of the lime and paraffin wax as a binder to support it. It is used in the final finishing operations as a polishing medium when cloth wheels or tampico wheels are used. The preliminary operations are accomplished as usual with felt or leather covered emery coated wheels using from 60 to 160 emery upon the surface.

Emery pastes are also used in the final finishing operations in connection with cloth buffs or tampico brush wheels.—C. H. P. Problem 2,106.

SOLDERING

Q.—We should be obliged if you could tell us of a material that could be applied as a paste or varnish to prevent soft solder running on brass and copper surfaces in directions where it is not required.

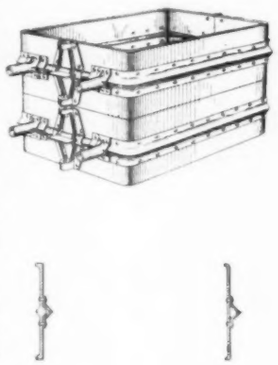
A.—Use a solution of sodium silicate, which is commonly termed water glass. The material may be thinned down with water. A little of the material applied to the copper or brass surface will prevent the soft solder running over such protected surfaces.—C. H. P. Problem 2,107.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY

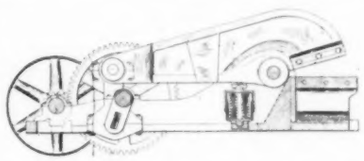
1,122,321. December 29, 1914. **Foundry Flask.** T. R. Smith, Milwaukee, Wis., assignor to Sterling Wheelbarrow Company, of the same place.

This invention relates to improvements in foundry flasks constructed of rolled metal on account of its light weight in proportion to its strength in the plane of the metal, and the objects of the improvement are to provide the necessary stiffening against lateral strains transverse to the plane of the metal and against torsional strains tending to twist and distort the flask as a whole, by adding metal only at the proper place and only in the proper relation or disposition thereof to produce the desired effect, having due regard to cheapness and practicability of construction. These objects are attained by the features of construction illustrated in the accompanying drawing.



1,122,319. December 29, 1914. **Alligator Shears.** A. O. Sleutz, Canton, Ohio, assignor to the Canton Foundry and Machine Company.

In ponderous machines of this type, the heavy weight of the rear end of the shearing arm, with the added weight of the pitman and the cranks, has rendered it difficult to stop the machine in open position, because the momentum of the downward movement of these parts in opening the shears tends to cause the cranks to swing beyond the pendent position and thence upward again beyond the range of the clutch disengaging mechanism, thus resulting in a continuous operation of the shears. This difficulty is overcome, and ancillary advantages are attained, by providing means, as shown in cut, for equally balancing the excessive weight of the rear end of the shearing arm, the pitmen and the cranks, thus relieving the crank shaft from the weight of these parts, and by providing a friction spring for stopping the cranks in the proper position when the clutch is released and the shears open.



1,122,340. December 29, 1914. **Process of Removing Zinc from Zinc-Coated Material.** Josef Weber, Essen-on-the-Ruhr, Germany, assignor to Goldschmidt Ditmuing Company, of New York.

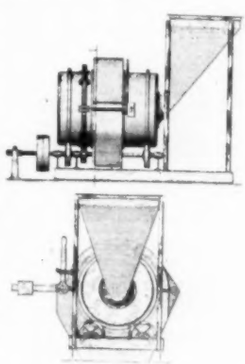
The invention relates to a process of removing zinc from zinc-coated material, especially zinc-coated iron in the form of sheet material, and the main object of the invention is to effect a more perfect separation of the zinc from the other material more economically than has heretofore been possible.

In all of the processes that have been proposed for this purpose, however, the great drawbacks have been that in addition to the zinc a considerable amount of the iron has been dissolved by the reagent used and that the black sheet scrap is left by the reagent in such condition that it afterward becomes considerably corroded. Because of this action of the reagent on the iron much of the solution was wasted and it was very troublesome, expensive and attended with great losses of the zinc content to remove the iron from such solution as the precipitated iron, even though very carefully washed would always contain a considerable amount of zinc.

The present invention employs a solution which has no acid reaction and is not a solvent of iron and is preferably a basic or neutral solution of chloride of zinc.

1,122,659. December 29, 1914. **Mixing Machine.** T. J. Sturtevant, Wellesley, Mass., assignor to Sturtevant Mill Company of Maine.

This invention relates to certain improvements in the so-called "Hunso" mixer or mixing machine covered by U. S. Patent No. 985,299, dated February 28, 1911, and has for its object to provide convenient means for discharging the mixed material, as well as to improve the efficiency of the machine, and to avoid objectionable friction which results from the construction hereinbefore in use, and in which some of the material leaks out between the rotating drum and the surrounding stationary housing, so that it scrapes around between the drum and housing, causing more or less friction.



In carrying the present invention into effect the rotating drum, shown in cut, is provided with a series of openings closed by swinging doors which, when the means for holding them closed is released, will open by gravity for the discharge of the material as the openings and doors approach the lower side of the drum in its rotation, and will also be closed by gravity as the openings and their doors move upward, such gravity closing being preferably assisted by means which will force the doors tightly to closed positions if their weight is not sufficient to effect this result.

1,122,675. December 29, 1914. **Method of Making Compound Metallic Articles.** C. C. Baldwin, Perth Amboy, N. J., assignor to Standard Underground Cable Company of Pennsylvania.

This invention relates to improvements in method of making compound metallic articles. The method described in this patent is used for making copper-clad wire.

One method of manufacturing copper-clad wire is to proceed (having previously provided a solid core of steel and a solid tube of copper) to properly clean the surfaces; to drive the closely fitting sleeve over the properly cleaned core; and finally to heat the blank so compounded and to reduce it, first by rolling and then by drawing, to the ultimate form of wire. It is a desideratum in this operation and indeed in all operations which involve the uniting of different metals, surface to surface, that the greatest care be taken to get an intimate union of the components of the blank over clean surfaces.

A refinement upon the method just stated in outline (and applicable in the practice of the invention, if desired) is this: to coat the steel core, after it has been cleaned and before the sleeve of copper is applied to it, with an electro-plating or chemically deposited coating of copper or other suitable metal. Other coating methods are, of course, permissible, as, for example, dipping in molten metal.

Another improvement resides in employing as the mandrel upon which the last step of the tube-making operation is performed, the steel core with which the tube is to be compounded to form the blank from which the wire is produced. That is to say, instead of forming the copper tube apart from and independently of the core and when it has been formed

applying it to the core, to bring the copper tube as such to its ultimate form directly upon the core.

1,123,685. January 5, 1915. **Precipitant for Recovering Metals from Solutions.** G. H. Clevenger, Palo Alto, Cal., assignor to Merrill Metallurgical Company of California.

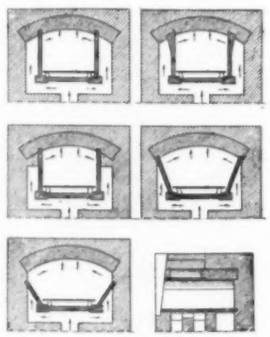
This invention relates to an improvement in precipitants for recovering metals from solutions, and particularly to that class of precipitant which is employed for the precious metals from cyanid solutions.

In practice, various forms of precipitants are used, but the most satisfactory and economical precipitants which have hitherto been employed in this art are precipitants composed of malleable metallic zinc in the form of either threads or spheres, the spheres composing what is known in practice as "zinc fume" or "zinc dust." On account of its malleability, metallic zinc has hitherto resisted any form of mechanical communition down to a powder which will expose sufficient surface to enable it to be used in a process of precipitation which involves agitation, conduction of the mixture and the subsequent filtration thereof.

In this connection the inventor has discovered that a powder made from a binary brittle alloy of zinc and alcaline earth metals will satisfactorily answer the purpose.

1,124,380. January 12, 1915. **Muffle Furnace for Enameling.** Oscar Zahn, of Berlin, Germany.

This invention relates to muffle furnaces for firing enameled or other ware without direct flame contact and has for its object to improve the construction of such furnaces.

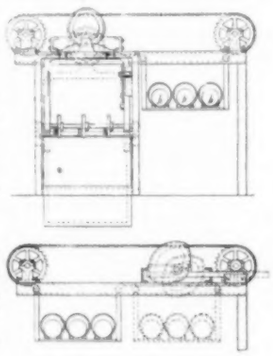


According to the present invention prevailing disadvantages are obviated by preventing excessive heating in the upper part of the muffle chamber. This object may be attained in various ways. For example, the muffle furnace may be so constructed, as shown in cut, that the cover of the muffle is not subjected to the heat of the furnace gases, or the cover of the muffle may be wholly or partly insulated or of such thickness that the heat will not readily pass therethrough, or the cover of the muffle may be subjected to the heat of the gases only periodically.

1,124,785. January 12, 1915. **Galvanizing Apparatus.** Joseph Monto, of Cleveland, Ohio.

This invention relates to the art of coating metals, as, for instance, galvanizing.

Many features of the present invention are applicable to coating metals in general, regardless of the character or conformation thereof, although, in the accompanying drawing, the invention is shown as embodied in an apparatus more especially adapted to galvanizing or otherwise coating open-ended receptacles formed of sheet metal, such, for instance, as pails.

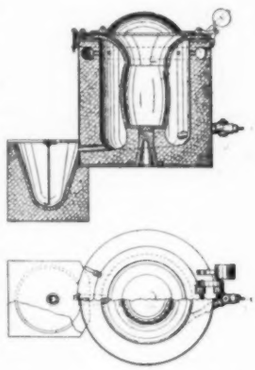


An object of this invention is to regulate the depth or thickness of the coating applied and, preferably, without materially changing or modifying the speed of the coating process; and, also, to provide means whereby all of the articles to be coated may receive a practically uniform and predetermined depth of the coating to be applied thereto.

Another object is to provide for the removal of the matter usually floating on the surface of the molten bath at the point where and just before the articles being coated are withdrawn from the bath.

1,125,090. January 19, 1915. **Metal Melting Furnace or Retort.** Maurice Goldberger, Fort Wayne, Ind.

This invention relates to improvements in metal melting furnaces or retorts, and its object is to provide a cheap, durable and efficient furnace or retort in which the heating flame and air are prevented from coming into contact with the metal during the melting process, thereby rendering the device non-oxidizing in its operation.



Another object is to provide means, as shown in cut, by which the interior of the furnace or retort is uniformly heated, thereby prolonging the life of the crucible or other metal container and the lining of the furnace or retort.

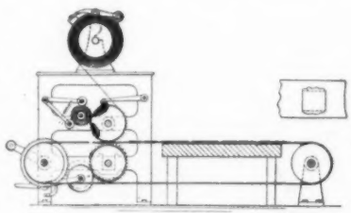
Another object is to provide means by which the heat within the device is retained and not wasted or lost upon opening the device for the insertion of subsequent charges.

Another object is to provide means by which sufficient metal may be placed within the device to fill the crucible when melted, the portion of the metal which is outside the crucible being superheated by the heat of the device and melted as it passes into the crucible and without coming into contact with the hot gases of the furnace.

1,126,006. January 26, 1915. **Machine for Packaging Metallic Leaf in Rolls.** L. M. Harwood, Springfield, Mass.

This invention relates to improvements in machines for packaging metallic leaf in rolls.

An object of the present invention is to eliminate the usual steps and transfer the metallic leaf, when finished in the beater's mold, directly to an endless conveyer, as shown in cut, this conveyer serving to transfer the metallic leaf onto the surface of a strip of paper and with which it is to be finally wound into the spiral form, or the commercial roll.



A further object of this invention consists in transferring the metallic leaf onto the surface of a continuous strip of paper, and winding the leaf and strip in the spiral form with the ends or edges of the continuous strip of metal remaining untrimmed, thus saving one-half the labor that is now necessary in cutting the leaf on all four sides.

1,126,055. January 26, 1915. **Heat Producing Compound.** W. F. McNabb and R. S. Wile, of Pittsburgh, Pa.; said Wile assignor to said McNabb.

This invention relates to heat producing compounds.

The object of the invention is to provide a new and improved compound, which when mixed with water produces large quantities of heat without flame or combustion, and which compound can be manufactured at low cost and is stable under normal conditions.

A further object of the invention is to provide a heat producing compound which combines with water to form an alkaline solution whose caustic solvent effect may be utilized for attacking oils or greases and other like substances, which are usually insoluble and are not attacked by most compounds of this character.

It has been found that excellent results may be obtained by the use of a mixture containing the various substances in about the following proportions:

Alkaline peroxid (Na_2O_2)	4 ounces.
Alkaline carbonate (commercial soda ash)	5½ ounces.
Metallic aluminum (filings)	1½ ounces.

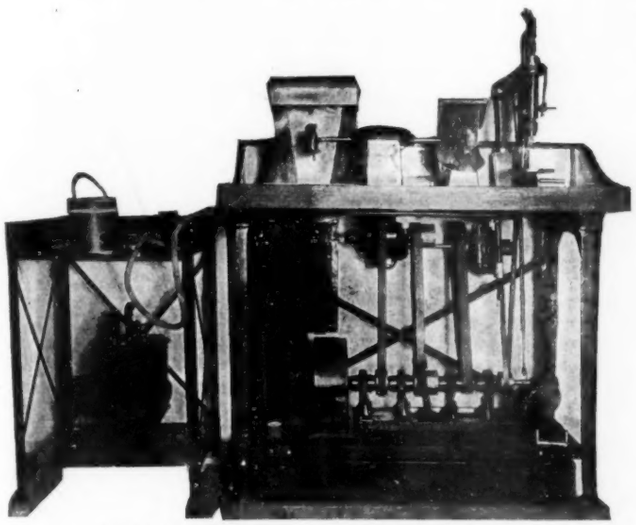
EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

COMPLETE WORKSHOP

Among the recent innovations calculated to arouse the interest of the metal industries is a new workshop bench, here shown, and known as "The Complete Workshop." Almost every metal worker has felt the need at some time or other of a small shop suitable for doing almost any kind of work, but in a great many cases the matter of space forbids the installation of the necessary machines. Then again there are a great many dealers, not to say manufacturers, who, while finding it mandatory to do their work, are hampered by the expensive rental of the necessary space. This, "the complete workshop," has been designed for the sole purpose of obviating these difficulties, and making it possible to do all sorts of work in the metal line within the most limited space.

First of all, the polishing dust-collecting outfit, forming the main part of this machine, is exceedingly useful, not to say essential in the makeup of every workshop in the metal line, and especially so to that shop connected with the ordinary salesroom or retail store. The use of this machine makes it possible to have the stock always looking fresh and bright and at the same



LEIMAN BROTHERS NEW WORKSHOP BENCH.

time preventing the dust and dirt from flying all over the place. In addition to this, when repair work is done and requires buffing, the small particles of precious metals which are removed in this operation do not float away through the air, but are drawn in by the powerful suction of air at both of the dust hoods, shown in the illustration, and deposited in the tank underneath the bench to be subsequently recovered and refined. Heretofore this material has been a total loss, but now it is possible to retain it and recover its value in new gold or other precious metals.

In addition to the dust-collecting outfit, the drilling machine, which is fitted with a high-grade chuck, is capable of accommodating a drill from 0 up to 5/16 inch. On the underside of the bench and fastened thereto is a pressure blower, with the necessary pipe connection running over to the left-hand side of the bench, where arrangements are made to connect the air supply to the furnace, as shown on the iron stand alongside the bench, or in its place the sandblast, shown underneath the furnace, may be connected and used instead whenever required. It will be noted that all of these machines are connected by belts to the shafting, shown on the lower platform, which in turn is operated by the motor hanging underneath the bench.

The motor supplied can be attached to electric lighting socket, and will give ample power to drive either of the individual machines, which is so arranged so as to make it possible to operate them individually. The furnace table, as shown, is a separate table which can be placed at the side of the polishing machine, or at any other part of the room. In this latter case, it will only be necessary to increase the length of hose to carry the air. The suction on the dust-collecting outfit is so arranged that by arrangement of dampers an increased suction may be secured at either hood, according to the one that is being used. It will be noted that the machine is supplied with a small dust hood on one side, which may be used for small work, while on the other side a larger hood is shown which is utilized when larger pieces are to be buffed. The polishing head shown may be fitted with chucks for different purposes, such as sawing, turning, lapping and other operations.

The shaft bearings of the machine are self-lubricating, as also are the bearings of the pressure blower and motor. The bench is zinc lined, so that it is easily kept clean, and the entire outfit may be operated from an ordinary electric light socket. The entire outfit is shipped all complete, set up, and ready to run, and may be easily handled and moved about from place to place, and it is only necessary to screw the electric light plug into the lamp socket to begin work.

In order to secure the same service that this machine is capable of giving, it would be necessary to purchase independent machines, which would cost a great deal more than this combination outfit costs, and it is stated by the manufacturers that the cost of the outfit is very reasonable, so that a great demand is looked for amongst retailers, and especially amongst small repair shops. The outfit is also adapted for those doing other small work besides metal work, and all of the different parts which are supplied with the machine are standard, well-constructed machines, and not in any sense experimental. The entire machine is substantially built and nicely finished, and the manufacturers of the outfit, Leiman Brothers, 62-J John street, New York City, will be glad to supply any information.

BRASS MELTING FURNACE

The furnace shown in the cut is being manufactured by Morrison Brothers, Inc., Dubuque, Iowa. This furnace, it is claimed by the manufacturers, will melt brass in a No. 50 crucible at the rate of an hour and a half for the first heat and not more than

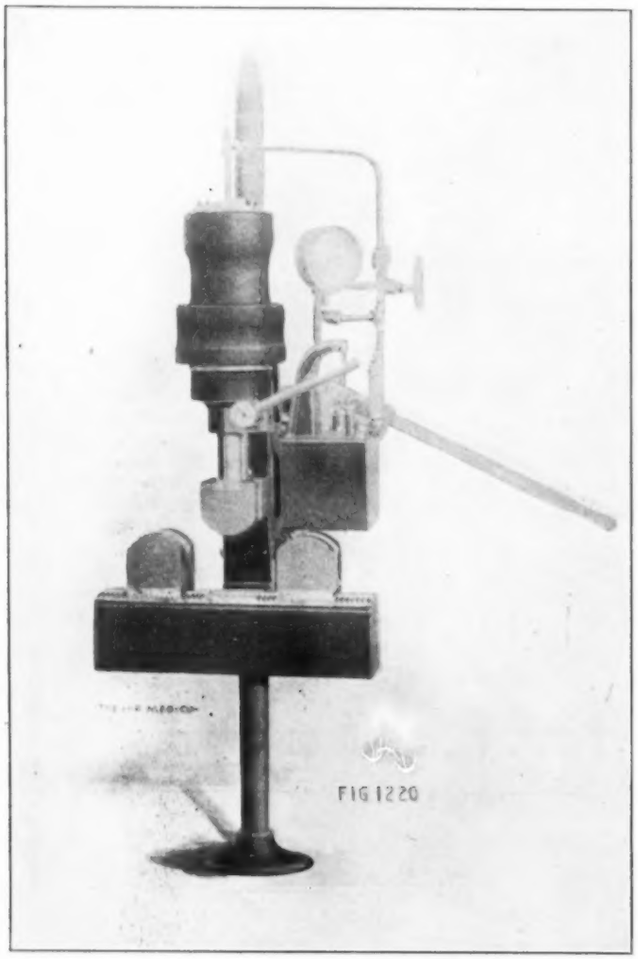
MORRISON BROTHERS BRASS FURNACE.

an hour and a quarter for each succeeding heat, the total capacity of the furnace being seven and eight heats per day of ten hours. It is said that the fuel, which is oil, required to operate the furnace, is very little and needs no special equipment, one furnace tender easily taking care of five furnaces. Further particulars regarding this furnace may be obtained by corresponding with Morrison Brothers.

30 TON HYDRAULIC PIPE BENDER

The illustration shows a press which was primarily designed for bending pipe of various sizes. However, the press is also adaptable for miscellaneous bending work which comes up in machine, railroad and automobile shops, such as bending and straightening axles, small structural shapes, bars, shafts, etc. By the use of bending blocks, pipe up to 4 inches in diameter can be bent. Clamps are provided for attaching the press to a stanchion which has a maximum diameter of 5 inches.

The construction of the press is of steel throughout. The "C" frame and bending bed are cast in one piece. The top of the "C" frame is provided with a ring into which the cylinder sets. When the cylinder is received into this ring and turned to its desired position it is keyed into place. There is an advantage in having the cylinder set in a ring in this manner, because it can be placed in any position desired, bringing the handle of the



THIRTY TON HYDRAULIC PIPE BENDING PRESS.

rack and pinion to any point which is most convenient to the operator. There is another feature about the press which, it is said, makes it more convenient than the common pipe bending machine; the bending blocks are changed without the use of wrenches, screws, etc.

The ram of this press is forced downward by a hand operated pump, with a plunger diameter of ⅝ inches and a stroke of 3½ inches. The pump is equipped with a ½ inch safety valve and a ½ inch Tee wheel operating valve. The reservoir is a part of the pump. A hand operated pump is more desirable on an hydraulic press of this kind because there is no danger of over bending the pipe or other material.

The ram has a diameter of 6 inches and a run of 9 inches. The pressing bed which receives the bending blocks is 27 inches long with a pressing width of 8 inches. When the ram is returned the distance from the top of the cylinder to the head of ram is 24½ inches. The daylight between the ram head and pressure bed is 14¼ inches. The height of the press over all is 3 ft. 11 inches. This press is a new design recently developed and added to the line of hydraulic machine tools manufactured by the Hydraulic Press Manufacturing Company, Mount Gilead, Ohio.

Arrangements and plans are now completed for an elaborate display of the hydraulic machinery products manufactured by this company, at the Panama-Pacific International Exposition at San Francisco, Cal. The exhibit is being installed in block 11 in the Palace of Machinery. The space to be occupied is 27 feet wide and 67 feet long.

The exhibit will be in charge of the company's Pacific coast representatives, The Berger & Carter Company, 1045 Seventeenth street, San Francisco, Cal. A practical hydraulic expert will be in attendance at all times to operate the machinery and explain the various features which characterize the hydraulic equipment manufactured by this company.

The following machinery will be exhibited and operated:

150-ton hydraulic wheel press.
75-ton hydraulic bar straightening press.
30-ton hydraulic pipe bender.
15-ton hydraulic broaching press.
Hydraulic triplex pump, motor driven for high pressure purposes.
Hydraulic steam pump for high pressure purposes:
Pressure and speed regulator for hydraulic steam pump.
Hydraulic valves for high pressure purposes.
550-ton hydraulic olive oil press.
500-ton 30 in. x 40 in. hydraulic curb scrap press.
150-ton hydraulic cider, grape juice, wine or tankage press.
Hydraulic cider, wine or grape juice press, 80 to 100 barrels capacity.
Hydraulic cider, wine or grape juice press, 30 to 40 barrels capacity.
Hydraulic Talbert cider mill.
Crawford filter, 3½ ft. in diameter.

Special foundations are being built in the space mentioned to support the heaviest of the hydraulic machinery which is to be exhibited. Complete hydraulic installations will be the feature of this exhibit.

SO-LUMINUM, A NEW ALUMINUM SOLDER

To dispense with the present oxy-acetylene method of repairing fractures in aluminum parts is the object of the Ludlow Auto Enginering Company, which has just established a sales office at 3435 Ludlow street, Philadelphia, Pa. The new solder is the invention of Karl R. Peters, a metallurgist of Berlin, Germany, and at the present time it is being manufactured in Philadelphia as well as in that country. The inventor claims that no breaks are too complicated to be repaired by the new method and that the work can be done at a saving of at least one-third the cost of the welding job. The strength of the solder, according to Mr. Peters, is about double that of aluminum as regards its resistance to tensile strains, and even greater as regards its resistance to bending. Outside of the greatly reduced cost of making the repair, it is claimed that the work attached to the job is no more than in ordinary soldering. Instead of having to purchase an expensive welding outfit, consisting of oxygen tanks, acetylene and welding jets, the ordinary gasoline torch can be used. Another advantage claimed by the Ludlow Auto Engineering Company for its products is that the work requires no machinery after the soldering is run in place. In performing the work on aluminum casting that has been broken into a number of pieces, the various parts are matched as closely as possible and screwed down on a jig. The fractures are then chiselled in the form of a V-shaped slot in the same manner as for a welding job. The solder, which knits at a temperature of 400 deg. Fahrenheit, is then run into the slot and finds its way down into crevises between the two pieces of metal. Upon solidifying the joint is made. The Ludlow Auto Engineering Company will either do the repair work itself at its factory at 3435 Ludlow street, Philadelphia, or will sell the solder, together with territorial rights and instructions for its use in garages or repair shops.

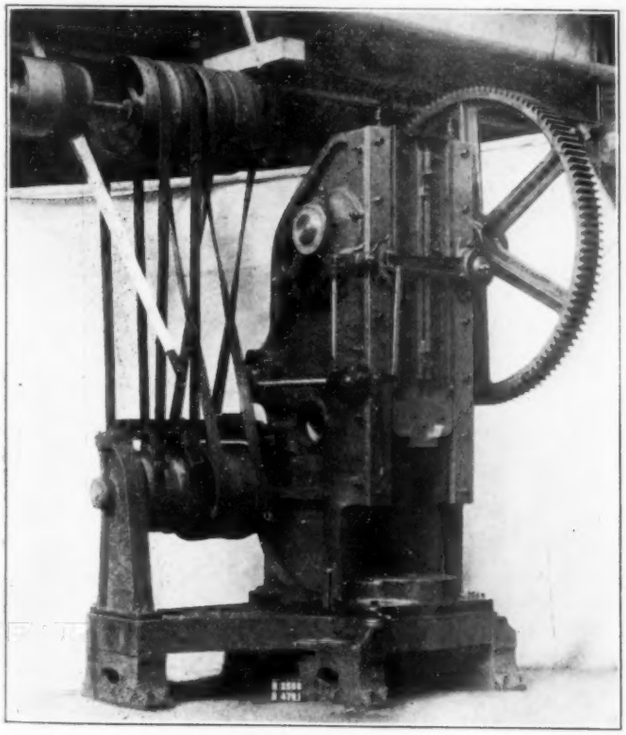
NEW EUREKA SPRAYERS

The Eureka Pneumatic Spray Company, 62-64 Ninth avenue, New York City, announces improvements in sprayers. Model No. 13 is now being made with a sensitive trigger control of such delicate adjustment that a baby could operate the valve without effort. Another valuable improvement is the introduction of an air pressure reducing valve enabling the user to regulate the pressure to his entire satisfaction; regardless of how high the pressure is on the pipe line and doing away with the necessity of a reducing valve and gauge; thereby saving the cost of these. An operator may also make different changes in the size of spray with this new improvement. Model No. 13 may either be had with glass container or seamless brass, heavily nickleplated pot. A new catalogue has just been received from the press and describes and illustrates the full line of sprayers, air filters, compressors, etc., and users of sprayers should write for one of these latest editions of the Eureka catalogue.

The firm also announces that it has discontinued the sale of lacquers, enamels, and all other materials, confining itself strictly to spraying apparatus, and is at all times willing to give expert advice, which fourteen years' experience qualifies it to give in the different trades that its sprayers are used. The new models of sprayers will be exhibited at the coming banquet of the American Electro-Platers Society, at the Broadway Central Hotel, on February 20.

LONG STROKE HEAVY DRAWING PRESS

To fill the demand for a long stroke heavy drawing press that would have greater capacity than the ordinary commercial machine the Waterbury Farrel Foundry & Machine Company, Waterbury, Conn., have brought out a new press of the rack and pinion type with shifting belt drive as illustrated, which has a capacity of 60,000 lbs. working pressure. It is useful for drawing long shells of brass, such as are used for field gun cartridge cases, thermos bottles, tire pumps, plumbers' supplies and tubes for seamless wire. The special points in design are high speed combined with convenience and ease of adjustment. The machine is driven by double belts, which insure against accident from over-running the gate should the belts break. The stroke of the gate is adjustable as required from a maximum of 48 inches down to approximately 12 inches. This is accomplished by adjusting the dogs on the front of the gate, which automatically shift the belts on each end of the stroke by the well known shifting belt principle used on many makes of planers. By operating the handle shown at the left of the illustration the operator can reverse the gate or stop it at will. The machine is supplied with three speed changes, high, intermediate and low, which are obtained by change gearing. At the highest speed the gate has a drawing speed of approximately 20 ft. per minute and return speed of approximately 25 ft. per minute; the slowest speed has a drawing stroke of 10 ft. per minute and return stroke of 12½ ft. per minute. At the high speed the machine will pull twenty tons, or at the intermediate or slow speed will pull to the full capacity of thirty tons.



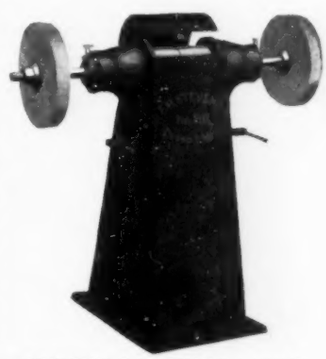
LONG STROKE HEAVY DRAWING PRESS.

Working pressure	60,000 pounds
Maximum stroke	48 inches
Stroke adjustable as required down to approximately	12 inches
Total weight of machine	27,500 pounds
Total height of machine with gate at highest point	14 ft. 2 in.
Floor space over all front to back by side to side	7 ft. 6 in. x 8 ft. 9 in.

The machine furnished complete with countershaft and gear guards.

NEW POLISHING LATHE

The lathe shown by the cut accompanying this article is claimed to embody in its manufacture every new idea in polishing lathe construction. The main bearings are, of course, on ball bearings and the loose pulley is equipped with ball bearings, so that the one vital objection has been overcome. In addition to the ball bearing features of this lathe, it has several other features of its construction which are worthy of mention. The bottom of the column is made very large, the inside measurements of which are 22 inches by 12 inches, so that it can be run from underneath, from a very slow running line-shaft. In addition to this advantage it gives great stability to the lathe itself. The lathe column is made with a straight front, so that there is no obstruction in the way of the workman. The lathe may be run from underneath, overhead or from behind, whichever is more convenient, and when run from underneath, the machine is equipped with a belt shifting device and with a pulley cover. The weight of the machine is 600 pounds. This lathe is manufactured and for sale by Frederic B. Stevens, Detroit, Michigan.



STEVENS POLISHING LATHE.

SOLDERING COPPER HANDLE

The illustration gives a good view of the Walls indestructible soldering copper handle. This handle is manufactured by the T. P. Walls Tool and Supply Company, New York, and is claimed to be cool no matter how hot the soldering copper may be. As shown in the cut the groove locks the shank of the copper, and the handle and copper become as though they were cast together.

WALLS SOLDERING COPPER HANDLE.

It is claimed by the makers that this handle will outlive twenty-five of the common wooden ones and that more work can be done with it.

ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE METAL INDUSTRY ORGANIZATIONS.

AMERICAN ELECTRO-PLATERS' SOCIETY

New York Branch held its regular monthly meeting Friday evening, January 22, 1915, at its rooms, 262 Pearl street, New York City, where they are establishing a laboratory for experimental purposes. The branch has decided to hold two meetings each month, the second and fourth Friday in each month. The first meeting of the month to be devoted to laboratory work and the last to general business. They have also decided to raise the entrance fee from one dollar to five dollars.

As announced in previous issues of THE METAL INDUSTRY the sixth annual banquet of the New York Branch will be held at the Broadway Central Hotel, New York City, on Saturday evening, February 20, 1915. The banquet committee report that they have obtained an exhibition of plated material in all finishes, a paper by M. G. Weber of the same branch and who was unable to be present, on "Standardization for the Plating Department." S. D. Benoliel, of Philadelphia, gave an interesting impromptu address on "Cleansers," and L. H. Sturdevant, of Philadelphia, gave an interesting talk on lacquers. After the meeting a luncheon was served and during the good fellowship which prevailed a number of the visitors made application for membership to the society, thus attesting to the value of these "get together" occasions for increasing membership.

THE ST. LOUIS BANQUET.

The banquet of St. Louis Branch A. E. S., held at the American Annex, St. Louis, Mo., Saturday, January 23, is now a mat-

ST. LOUIS BANQUET OF AMERICAN ELECTRO-PLATERS SOCIETY HELD AT AMERICAN ANNEX, ST. LOUIS, MO., JANUARY 25, 1915.

and also secured several prominent speakers. A committee will be in the hotel parlors all day on February 20 to take care of members and their friends. Any samples that are to be exhibited can be sent to the American Electro-Platers' Society, care Broadway Central Hotel, and will be taken care of by the management there until such time as the exhibit is to be set up.

Philadelphia Branch held an open meeting at the Hotel Windsor, January 15, 1915, which was eminently successful. The entire membership of the branch, together with about forty visitors from Baltimore, Washington and further, were present. A number of speakers were introduced by Joseph L. Dinan, president of the branch, and among these were Charles H. Proctor, founder, Walter C. Gold, of Philadelphia; George H. Niemeyer, of Newark, and Carl Dittmar, of New York, who read ter of history, and to those who were fortunate enough to be present, it will ever be held as a lasting pleasure and an educational treat.

The guests began to assemble at 6:30, and the reception in itself offered an opportunity for the exchange of that handshake and immediate friendship spirit for which these events are becoming notable. It also offered an opportunity for renewal of acquaintance and exchange of thought among the various employers, superintendents and other guests who were present. The period of time allotted for the reception was an enjoyable one, but all were looking forward to the big event. At exactly 8 o'clock, all sat down to the banquet tables and a photograph was taken, after which all enjoyed the splendid repast.

PROGRAM.

Introduction, E. J. Musick; "Trials and Troubles of a Plater," H. J. Richards; "Electro-Plating and Chemistry," Robert Fischer, instructor of chemistry, McKinley High School; "Nickel Plating and Standardizing," F. Rushton; address, A. R. Morgan, principal, McKinley Evening School; "Electro Coloring of Metals," P. Tressider; "The American Electro-Platers' Society," H. H. Williams.

Before beginning the regular order of the program, W. H. Williams, secretary of St. Louis Branch, read letters of regrets from James H. Hansjosten, supreme president; Charles H. Proctor, founder of the society; Walter Faine, supreme secretary; J. E. Sterling, superintendent treasurer; H. E. Willmore, editor-in-chief of the *Monthly Review;* E. W. Heil, of Wichita, Kan., member of St. Louis Branch, and also a telegram of good will from Chicago Branch.

The opening address by E. J. Musick, president of St. Louis branch and toastmaster of the evening, was a masterpiece as showing what the society stands for and its accomplishments to date. All the addresses and papers were received with marked attention, and the address of A. R. Morgan, principal of McKinley High School, and Robert Fischer, instructor of the class in chemistry, are worthy of special mention.

Following the completion of the program the following gentlemen were called upon for impromptu remarks: Lee W. Van Cleave, president of the Buck Stove & Range Company; D. P. McCabe, purchasing agent of the Majestic Manufacturing Company; Mr. Hamman, superintendent of Quick Meal Stove Company; Lucas Edell, superintendent Majestic Manufacturing Company; Mr. Evans, general foreman, Wagner Electric Manufacturing Company; F. Coffman, general manager, Boorum-Pease Loose Leaf Book Company; Mr. Hoffman, purchasing agent, Bridge-Beach Manufacturing Company; Harry Adams of the Frank Adams Company, and W. H. Musick of the Musick Plating Works. The responses from these gentlemen certainly showed that they were impressed with the work of the society, and the remarks by Messrs. Van Cleave and McCabe are worthy of special mention.

St. Louis Branch must be accorded a great deal of credit for its ability to do things. With a membership of only thirty men, and an attendance at this banquet of seventy-five guests, in which were represented some of the most prominent men connected with stove and other manufacturing plants of St. Louis, certainly shows that the work of the society has made a profound impression upon them, and the credit for this situation is due to the membership of this Branch, and it surely demonstrates their standing as "Men among Men."

BANQUET NOTES.

E. J. Musick, president of St. Louis Branch, was one of the busiest men of the Branch.

C. E. Wygandt, vice-president of St. Louis Branch, was among those present from Belleville, Ill. Always unpretentious, but a hard worker for the Branch in his own quiet and earnest manner.

Frank Rushton and his colleagues of the arrangement committee, were hard workers, and the fruits of their labors were in evidence on every hand.

H. H. Williams, secretary of the St. Louis Branch, and second vice-president of the Supreme Society, was much sought out by those present; big in physique, as well as possessing all the elements that go to make up those superb qualities of a man among men, it is only natural that he should command attention, and that all who can would want to know him.

H. J. Richards was very much in demand. His work as librarian of St. Louis Branch is bearing fruit, and his witticisms are always thoroughly enjoyed. If Mr. Richards should attend the next convention at Dayton, Ohio, or any subsequent convention, he will undoubtedly carry away the honors as supreme "wit" of the society.

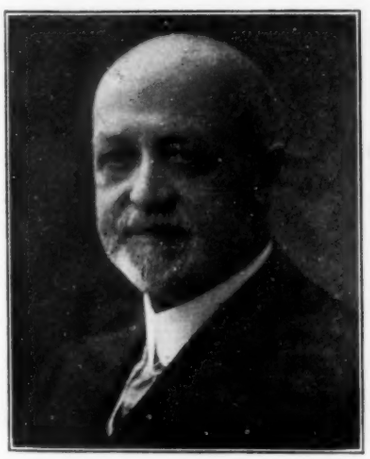
E. W. Heil, member of St. Louis Branch, and located at Wichita, Kan., although unable to be present personally, showed his interest by letter and also by presenting a sample of his work in the shape of a lamp bowl filled with "A La Rotary Pudding," or in English, choicest home-made candy, which served as after dinner mints, and the bowl was afterwards used to serve the cigars, and attracted considerable attention.

PERSONALS

ITEMS OF INTEREST TO THE INDIVIDUAL.

EUGENE P. GOLDEN

Eugene P. Golden, who recently resigned as superintendent of Factory E, of the International Silver Company, New Britain, Conn., had completed forty-eight years of consecutive employment. Mr. Golden has just celebrated his sixty-second birthday and he had always hoped to retire at sixty, but his uniformly good health had caused him to retain his position two years longer.



EUGENE P. GOLDEN.

Mr. Golden started to work in the silver industry in 1865 and his life has been spent in this service ever since. He was a metal spinner and in due time he became foreman and finally had charge of the lower floor at the Britannia shop. In 1893 he became superintendent of the hollowware department, a position which he has held ever since.

Mr. Golden was active politically in his home town, having been Republican councilman and alderman under three successive mayors, and he held important positions as chairman of various public committees. Mr. Golden's brother, Senator William H. Golden, has been with Factory E of the same company for fifty-six years.

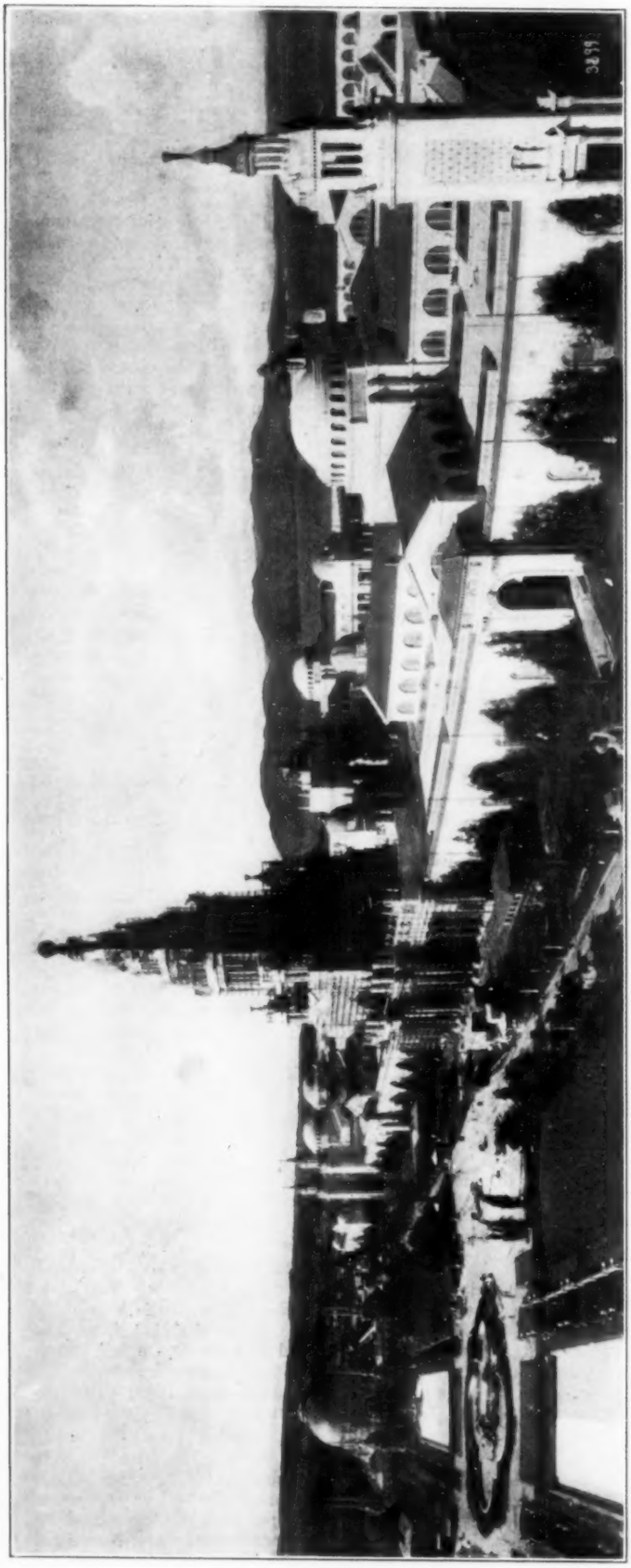
Mr. Golden was a steadfast admirer of THE METAL INDUSTRY, and he says in a recent letter, "I consider THE METAL INDUSTRY a most valuable paper and have enjoyed it and profited by keeping in close touch with same for many years, and I have in my possession every copy published for the past seven years. I consider the articles contained in it upon metals, their formulas and uses, well and intelligently written, and that they are the products of a master mind."

W. A. Cook, the well-known metal man, has been appointed eastern representative of the Matthiessen & Hegeler Zinc Company, with offices at 253 Broadway, New York City.

James H. Stitt, formerly connected with the Roessler & Hasslacher Chemical Company, New York, N. Y., announces his connection as general eastern representative of the Ele-Kem Company, Chicago, Ill., with headquarters at 185 Madison avenue, New York City.

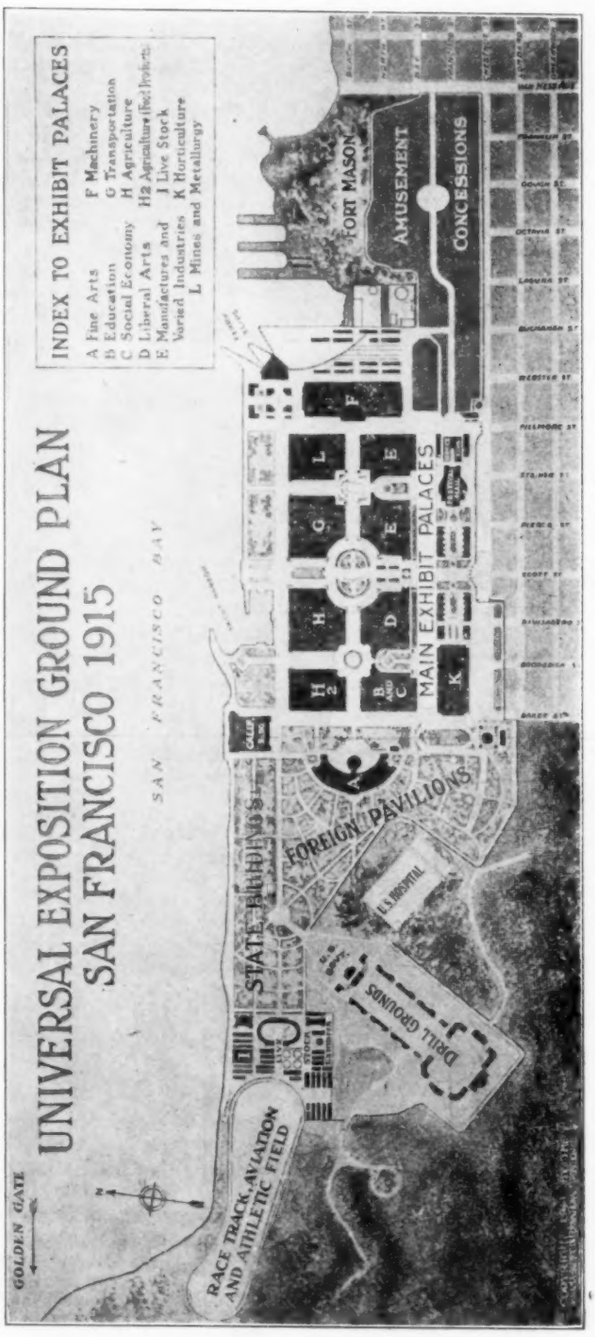
W. A. Locke, president of the American Manganese Bronze Company of Holmesburg, Philadelphia, retired from that company February 1, and is now associated with the Taunton New Bedford Copper Company, with mills at Taunton and New Bedford, Mass.

THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION AT SAN FRANCISCO



A PART OF THE MAIN EXHIBIT SECTION OF THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION, SAN FRANCISCO, CAL., 1915.

Panorama, taken from the dome of Festival Hall, at the Panama-Pacific International Exposition. The view shows the western part of the main group of exhibit palaces. The tall Tower of Jewels, in the center, which is 435 feet high, conceals the famous Golden Gate entrance to the bay of San Francisco. The domed structure at the left is the Palace of Horticulture. The other palaces shown, from left to right, are those of Education, Liberal Arts, Agriculture, Manufactures and Transportation. Beyond these is shown the bay of San Francisco, with Mount Tamalpais and the hills of Marin county in the background. In front of the Palace of Horticulture are the great South Gardens. The photograph was taken the middle of December, 1914, and shows the advanced stage reached by the Exposition at that time. The Exposition opens on February 20.



MAP OF UNIVERSAL EXPOSITION, SAN FRANCISCO, CAL., 1915.

TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS AND TRADE ITEMS OF INTEREST FROM THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

FEBRUARY 8, 1915.

War is keeping Waterbury industries going just about now, and the same is true of most of the metal business throughout the Naugatuck Valley. There is mighty little activity in any factory or department which does not produce war goods, either the finished munitions of war or the brass, copper or composition metals which are required for ammunition or guns. This activity in the production of special order goods for war purposes has brought about a remarkable rush of machne orders, all of which, practically, are for machines required by concerns in various parts of the world engaged in the production of artillery, armor, war munitions for land, sea or aircraft. The situation at large may be summed up thus: Special business due to the European war is very brisk; normal business never was at a lower ebb.

There is some general improvement in conditions at large as far as the number of hands employed is concerned and as to the size of payrolls, but the low ebb of regular business is reflected in many sidelights of local and neighboring industry. At the same time there is some optimism and the men who are at the head of the varied industries hereabouts—their variety is what keeps them from being flat at this period—are philosophical. They realize that the chief reason why normal business is low is because of the war and its effect on the world's business and purchasing power. They look forward to early improvement after the conflagration if conditions in this country are not seriously upset, but they are not making predictions. Among the shops that are most busy with special orders—"Government orders" they are called, but without the government's identity being disclosed—are the Scovill Manufacturing Company and the Chase Rolling Mills. At Scovill's there are night and day gangs at work, but in regular production there is hardly any activity. At Chase's big new tube mills in Waterville there is constant activity night and day, seven days a week. The E. J. Manville Machine Company, Rowbottom Machine Company, Waterbury Farrel Foundry and Machine Company, are especially active getting out special orders for machinery, and there is a constant flow of raw material and finished or partly finished goods in and out of the freight offices in the railroad yards. The production of automobile materials and special metal products on "Government" orders is keeping a considerable portion of the American Brass Company's branches active. There is a temporary boom in the spoon industry, and the local plant of the International Silver Company is active, with practically normal forces in all departments. There are two score or more English army officers here and it is generally understood that their business is the inspection of materials ordered for the British war office. Most of the goods produced here now goes to points within the United States. Some goods are shipped to European ports, but probably the greater portion of products now going out of this valley is addressed to concerns which turn out the finished products.

The annual meeting of the American Brass Company was held last week and the statement showed a falling off in business for 1914. This week Thomaston expects developments at the annual meeting of the Seth Thomas Clock Company; otherwise there is little to report of annual meetings. Clock business is sluggish and watch business is poor. This month finds the Waterbury Clock Company back on a short-time basis, after a start on a six-day schedule in January; married men are working five days, single men four days a week. In Thomaston there has been a slight improvement in the clock department of the Seth Thomas Company which has gone to a four-day-a-week schedule. The Plume and Atwood Company's mills, both in Waterbury and Thomaston, are busy.

It is apparent that during the past year the Naugatuck Valley manufacturers have been forehanded as to their supplies of raw materials; millions of pounds of copper have been accumulating and now this policy is bearing reward. There is still a generous inflow of raw metals and consequently the rising prices cause some concern, but there is no great anxiety felt just now over the outlook in this direction.—F. B. F.

BRIDGEPORT, CONN.

FEBRUARY 8, 1915.

Steady employment continues to bless those who seek and find their livelihood in the metal industry in this city. The war, that has caused some depression in other manufacturing businesses, seems to have given the metal workers an impetus that will carry them through the winter unscathed by the usual lay-offs of from six weeks to three or four months.

One of the busiest concerns in the State, and it is safe to say New England, is the Locomobile Company of America. This company, reported something short of a year ago as ready to conclude its affairs, is now running day and night in all departments, filling an order for the Allied armies in the European conflict. This order calls for 500 three- and five-ton automobile trucks, with such extra equipment that the order really means 750 trucks.

That this order comes from the Allies is evident, if not by the elaborate provision for immediate repair in case of injury, then by the refusal of the officials of the company to tell from what source the order came. It is common talk among the employes that it is a war order. The Remington-Yost Typewriter Company's ribbon factory, located here, is making extra nuts and bolts for the Locomobile Company, under contract.

That is one phase of the metal boom, but there are others. Two stories of the extensive addition to the immense plant of the Bridgeport Brass Company now rise from the ground at East Main street and Crescent avenue. Work is being rushed day and night to have the building ready for occupancy by the first of June. The brass company management is enrolled on the side of the optimists.

The Union Metallic Cartridge Company is another concern that is working day and night. A new four-story addition is rapidly nearing completion, workmen of the Berlin Construction Company keeping at it in day and night shifts. As is well known from the recent controversy with Count von Bernstoff, the U. M. C. Company firmly denies that it is filling war orders. The brass company is reported to be furnishing metal parts for the products of the U. M. C. Company.

Conditions are slowly improving at the American Tube and Stamping Company. President C. D. S. Miller is optimistic. The Singer Manufacturing Company is running slightly less than normal.—E. C. D.

NEW BRITAIN, CONN.

FEBRUARY 8, 1915.

Without deviating from the facts at hand it may be said that throughout the entire Hardware City the stagnation felt in metal manufacturing lines during the year 1914, and more particularly during the latter half, is still prevalent, and with one or two exceptions every one of the big concerns stand just about where they did three months ago. As yet there has not been any indication of the much heralded and much hoped for prosperity boom with the new year and those who are looking for a sudden business revival seem doomed to disappointment.

It is true that at the North & Judd Manufacturing Company business is more brisk than it has been in many a year, and in some departments it has become necessary to employ a night and day shift. This is due to the unusually large orders received. One mammoth order recently put out was at once duplicated and that in turn was duplicated again, giving grounds for the suspicion that it was for the allied armies of Europe. As the other concerns are still on short time and are working with greatly reduced forces the employment agency at the above-

named concern is daily swamped with eager applicants for work. As yet there seems to be no let up in the business here, and indications are that there will be none very soon.

In direct contrast is the Stanley Rule & Level Company. This concern has been running on pitifully short time for months, and not yet has the silver lining to its cloud of gloom become visible, and even more employees are being laid off because of lack of orders. Business remains about the same at P. & F. Corbin's, the Stanley Works, Russell & Erwin's, and the Corbin Screw Corporation, but at the Landers, Frary & Clark cutlery works there are signs of renewed activity in some departments. It is intimated that this concern is planning to move its celluloid department to Plainville, a nearby suburb. Already the officials have bought a large tract of land there. Good orders having been lately received, the business at the New Britain Machine Company appears more lively. More men have been hired and the working schedule has again been extended to full time.

The officials of the Union Manufacturing Company have prepared their annual statement, which shows their resources to be $653,924.56. Of this amount $346,348.69 is in the plant account, $188,012.90 in the merchandise and supplies, and $119,562.97 in cash and accounts receivable. The liabilities are: capital, $500,000; accounts payable, $5,188.83, and surplus, $148,735.73; total, $653,924.56.

Articles of incorporation of the Corbin Lock Company have been regularly filed with the authorities. This new concern is made up of men prominent in the American Hardware Corporation, and is a sort of wheel within a wheel, a mere technical concern. It will manufacture nothing, but will act as the selling agent of the Corbin Cabinet Lock Company. The incorporators are: President Henry C. M. Thompson (president of the American Hardware Corporation); Charles B. Parsons (general manager of the P. & F. Corbin division); C. H. Baldwin (head of the Corbin Cabinet Lock branch); Hon. Andrew J. Sloper and George T. Kimball.

Early last month the forty odd salesmen employed by the Stanley Works returned home for their annual convention, which lasted a week. Regular meetings were held and business conditions and prospects discussed. Instead of concluding with a banquet as usual the men sacrificed that enjoyment and voted to have this money used for charitable purposes.—H. R. J.

PROVIDENCE, R. I.

February 8, 1915.

Business conditions generally have shown a marked improvement during the opening month of the new year, and it has been stated by a man who is in a position to know, that during that period more men were given employment in the metal trade establishments of the State than in the previous six months combined. The call for men continues and good tool makers and metal workers are becoming a premium. Jewelry, being a luxury, the industry continues to feel the effects of the depression of the past year and it will be some time before it fully recuperates. At present it is stated on good authority, more than 50 per cent. of the normal output is stopped at the present time and fully 50 per cent of the workers in jewelry and allied trades are either entirely out of employment or on a short-time schedule.

The machinery manufacturers are reported to have received several large-sized orders during the past few weeks, with numerous more in immediate prospect. War orders have had a considerable influence on the activities at many of these plants since the first of December, and it is reported that a number of establishments are at present working upon goods that will either be used directly by the contending armies or will be used to manufacture goods for those armies. A number of the small tools and machinery establishments here that are being worked to nearly their full capacity supplying domestic concerns with machinery or tools which will be used in connection with orders from foreign governments. It is reported throughout the metal trade that the Potter & Johnston Machinery Company at Pawtucket is making a large amount of shrapnel shell for the French army. The plant is running to full capacity, and is shipping a large amount of machinery to France at the present time.

Rush work is the order of the day at the plant of the Standard Machinery Company at Auburn at present. The concern has received a large number of orders recently as a direct result of the war. More war orders were recently received at the plant of the Brown & Sharpe Manufacturing Company, but whether for machine tools or for war material, or both, no announcement has been made. Not only are the machinists and metal workers of this city being employed in the local establishments, but there is an increasing demand for Providence machinists and metallurgists throughout the country and in several plants located in foreign countries at the present time. This has been made plain during the last few weeks when the office of the Rhode Island branch of the National Metal Trades Association received calls for men from factories located in southern and foreign cities. These men were wanted, for the most part, to handle machines making shrapnel, and special inducements, it is claimed, were made for the men to accept the offers.—W. H. M.

ATTLEBORO, MASS.

February 8, 1915.

Business conditions in this city at the present time are decidedly discouraging. The manufacturers do not hold out much hope for an improvement for at least two months. Salesmen returning from Western and New York State trips report the jewelry trade practically at a standstill. Some of the traveling men anticipating this condition of affairs failed even to attempt a selling trip. Several meetings of manufacturers have been held with representatives of the Panama-Pacific Exposition in an effort to secure a jewelry exhibit for this city in the Jewelers' building during the fair. The local manufacturers, however, could not see commensurate returns for the expenditure involved, and it was decided to abandon the project.

The R. F. Simmons company declared their annual dividend this week. The letter to the employees announcing the dividend stated that business conditions were bad throughout the year, and that a surplus in other years made it possible to declare a dividend of 3 per cent. The letter had a hopeful tone, and predicted that relief from the present conditions was in sight for the near future. Among the other firms which are having night work or long-hours days are the F. L. Torrey Company, C. M. Robbins Company, C. H. Eden Company, W. E. Richards & Co.

According to the figures compiled by the Massachusetts State Bureau of Statistics and published one year after the fact, Attleboro's manufactured products for the year 1913 exceeded that of 1912 by $60,000. Of the $16,964,224, the total for 1913, $9,364,000, was jewelry manufactured. Probably these figures did not include the silverware. The wages paid during 1913 were $4,207,627.—C. C. C.

BOSTON, MASS.

February 8, 1915.

The past month has been a rather dull one for most of the factors in the metal industry in this city. There has been no real improvement in general conditions in the buildings trades, but city and State officials are trying to help in solving the "unemployed" problem by furthering construction work under government auspices.

It is calculated by agents of industrial aid organizations and others who come in contact with people out of work that there are more persons in need of employment in this city at present than at any previous period in a score of years. Many men have come here from other New England cities or towns in the hope of securing work and have found themselves stranded in a short time.

Outfitters in culinary lines for hotels and restaurants find demand slack for their products. There is a light call for interior hardware and nickel and silver plated fittings. Makers of metal furniture, brass beds, lacquered work and similar products, agree also that demand is slow.

Among the repairing silver platers, on the other hand, there appears to be a little more activity, although the manufacturers of new goods in solid and plated silver are not busy.

Manufacturing and repairing jewelers in gold and platinum lines have had a quiet month. Among the business troubles is the assignment of D. Goldwasser, of the Jewelers building.

One of the phases of the situation that affords some relief

to the employers is the subsidence of labor agitators. No strike talk is heard nowadays in labor circles. There are too many men ready to pounce upon any stray jobs that may show themselves, and workmen are more anxious to please their employers than they were a year ago.—J. S. B.

LOUISVILLE, KY.

FEBRUARY 8, 1915.

The Louisville coppersmiths are finding business fairly active just now in spite of the fact that distillery operations have been smaller than for several seasons. No new distillery work is to be had, as prohibition, local option, etc., as well as overproduction on the part of Kentucky distillers, has caused a general curtailment this year. A number of plants have not started running, and from present indications will not open this year. Repair work has necessarily been light. The outlook along other lines, however, is good. It is generally thought that cannery work will be far better than usual as growers' associations are springing up all over the country, and these associations in many cases have started canneries to use up their products during times when prices were low because of a bountiful production. Bronze is being used more liberally as a decorative material in new buildings, and a good deal of very handsome bronze work has been made for local buildings during the past few months.

Louisville coppersmiths are somewhat concerned over the rapid advances in copper during the past month. Six or eight raises have been experienced and copper on sheet basis is now quoted at 19½@20 cents. According to one of the prominent coppersmiths the consumption of copper in this country has been somewhat smaller during the past year, but export business has been larger. Due to the fact that the big smelters are not reporting their output any more, and the inability to ascertain just how much copper is being exported, the trade is not in position to estimate how much is on the market and the mills are in position to make prices to suit themselves. Buying, however, is of the hand-to-mouth order.

F. W. Farnsworth, representing the Detroit Copper & Brass Rolling Mills Company, of Detroit, Mich., was recently in Louisville calling on the local coppersmiths and to close a deal with the Louisville & Nashville Railroad for seven cars of copper to be used at the company's main shops at Louisville. This copper is used in making car journals and various other work in the big shops.

The Independent Brass Works, of which J. W. Rademaker is the head, has just finished a $7,000 bronze job on the new German Bank Building, at Fifth and Market streets.

The Knoxville Tinware Manufacturing Company, manufacturers of full lines of japanned and galvanized goods, etc., has outgrown its old plant and will shortly move to a large and commodious new plant at the corner of Fort Sanders avenue and the Southern Railroad, in Knoxville, Tenn. More floor space and a railroad switch give the company long needed shipping facilities.—G. D. C.

CINCINNATI, OHIO

FEBRUARY 8, 1915.

A conspicuously optimistic note is now in evidence among most members of the various branches of the metal industry in and around Cincinnati, due not only to the general improvement in business conditions, but to the excellent business which has been coming to a large number of the machine-tool manufacturers of the city. It is probable that the export business in this line is now more active than it has been for months, and this is rather caused by the war than hindered by it. As these manufacturers are among the largest local users of bronze and brass castings in this section, this means good business for concerns supplying this material; which, as a matter of fact, is actually the case. Several local foundries have received large orders recently from Cincinnati machinery manufacturers, and are in consequence busier than they have been for some time. It is true that some of the metal lines, notably, perhaps, copper, are not very active, the state of the liquor industry being rather depressed, resulting in a marked absence of work for the coppersmiths, as far as the distillers and brewers are concerned; but on the whole, the trade has no complant to make of the way things are going.

H. H. Suydam, president of the Cincinnati Manufacturing Company, which does a large business in metal specialties of various kinds, is the authority for the statement that business in a number of metal concerns coming under his observation in Cincinnati is at a high level. Mr. Suydam is especially optimistic concerning local conditions as compared with what he has been able to observe elsewhere. "The wide variety of industries in this city," he points out, "is showing its influence in the very small extent to which the city is affected by industrial depression. No matter how bad business may be in some lines, there is always a much larger number in which business is good. For example, business may be dull in some lines here, as elsewhere; but with the leading industries, such as machine-tools, shoes, harness, leather, clothing, and a few others, working on full time, things look pretty good to me in Cincinnati."—K. C. C.

COLUMBUS, OHIO

FEBRUARY 8, 1915.

There is a marked improvement in the demand for metals in Columbus and central Ohio. This is shown especially in copper, while there is a similar advance in the demand for brass. On the whole the tone of the market is much better and buying is going on more steadily. There appears to be a better demand from concerns making office furniture and fittings. Aluminum concerns are also buying a little better, showing an improvement in that line. The bad effects of the general European war are disappearing gradually, although it will require a long time for the market to recover its lost ground.

Men engaged in the metal trade are much more optimistic than formerly. They feel that there must be a gradual improvement under the influence of better industrial conditions, and preparations are being made to take care of the increased business as it comes. It is believed that buying on the part of railroads will soon start up a little, since the allowance of the 5 per cent. increase in freight rates.

The Rath Aluminum and Brass Foundry Company, of New Philadelphia, Ohio, has been incorporated with a capital of $10,000, to manufacture aluminum, brass and various metal castings, by C. J. Rath, N. W. Senhauser, R. S. Barton, C. R. Harlow, Walter Graff and W. Wagner.

Steps are being taken to organize the Enterprise Aluminum Company of Masillon, with R. E. Bebb, president and general manager, and Blaine Zuver, treasurer. The foundry will be temporarily established in one of the buildings of the Masillon Rolling Mill Company. Mr. Zuver states that arrangements are being made to equip a modern plant.

Papers have been filed with the secretary of state increasing the authorized capital of the National Bronze and Aluminum Foundry Company of Cleveland, from $10,000 to $59,000.—J. W. L.

DETROIT, MICH.

FEBRUARY 8, 1915.

The business outlook in the brass and non-ferrous metals is one of extreme optimism and has taken on that form since the first week of this month. It is not based on guess-work, as the present conditions warrant it. The year 1915 is going to be a good one, not only in one line, but in all lines. The long looked-for revival is no longer hoped for; it is here to a certain extent.

The best economists, financiers and judges of business conditions agree on the fact that the momentum of the decrease has been checked and that the upward climb has already commenced. There is more than speculation and prophecy to support this belief. There is tangible evidence on all sides. Big factories and manufacturing industries are getting back to a normal basis. Take the large stove manufacturing plants located here as an example: They have been adding every week to their working forces since the first of the year.

Another interesting phase of the recent condition is the way the motor car business has borne itself through it all.

Richard H. Scott, vice-president and general manager of the Reo Motor Car Company, reports that his concern is on the eve

of what promises to be the most prosperous in the history of that concern.

The plumbing, steam and allied brass manufacturing concerns are doing but little at the present time. They know that stocks of brass goods in the jobbers' hands are very low and that sagging prices will bound upward in the spring with a general increased demand, and the volume of business should be limited only by their ability to fill orders in the spring, when the season opens up.

The annual meeting of the stockholders of the Detroit Copper and Brass Rolling Mills was held this week. The following officers were elected for this year: Lewis H. Jones, president and general manager; Richard P. Joy, vice-president; Arthur H. Buhl, vice-president; John R. Searles, assistant general manager; Andrew J. Peoples, secretary and treasurer; Wallace P. Bache, assistant secretary and treasurer; J. E. Wortman, auditor, and Alexander Henderson, general superintendent. The above concern's business outlook is promising for 1915.—P. W. B.

There are a large number of brass manufacturing concerns located in this vicinity along the Canadian border towns, and trade has been very bad with them all ever since the first of September, 1914. Prospects at the present time are not any too bright; the prediction has been made, if the war in Europe shows signs of coming to an end on or before May 1, business will boom in all lines of industries.

Anker Holt Company, manufacturers of cream separators, are running with a full force and are making large foreign shipments to South America and Norway. They are located at Port Huron, Mich.

The Peninsular Stove Company, of Detroit, held their yearly meeting this week. This concern is one of the largest stove manufacturing plants in the country. During the past year the company has purchased and is now using the buildings of the Detroit branch of the Diamond Match Company, adjacent to its property, at Fort street West and Eighth street. The officers elected for another year are: President, Fred S. Morgan; vice-president and general manager, John M. Dwyer; factory manager, James M. Dwyer; secretary, Daniel S. Crowley; treasurer, Edwin L. Dwyer; superintendent, John H. Lane.—P. W. B.

J. W. Fussey, at the annual meeting of the Detroit Brass Company, was re-elected president with the other following officers: A. L. Hanson, vice-president; E. B. Whitcomb, treasurer, and G. C. Hall, secretary. The officers with E. D. Bronner and O. P. Benjamin are the directors.

The Barnes Wire Fence Company, 777 Grand river avenue, is erecting a new plant in Ferry Park, near Twelfth street, this city. The new building is a two-story brick, 50 by 60 feet, and equipped with the latest machinery. Besides wire fence, this company manufactures other wire goods.

The Essex Brass Works, located at 1408 Franklin street, this city, was badly damaged by fire recently and a number of employes had narrow escapes in making their way to safety. The loss is estimated at about $10,000, fully covered by insurance. Large quantities of completed goods were destroyed.

The annual automobile show closed here a week ago and was one of the most successful ever held locally. This exhibition always stimulates trade, not only in the automobile field, but also in the different brass and aluminum plants. Sales were reported as large as a year ago. The automobile industry shows a disposition to revive, and plants are now more generally in operation, which of course means a demand for brass, aluminum, etc. Manufacturers, as a rule, believe the coming year's business will be a surprise to the general public.—F. J. H.

BUFFALO, N. Y.

FEBRUARY 8, 1915.

Nearly all of the local metal dealers have had a steady increase of business since the first of the year. Orders are coming in daily, and this the local men believe is an indication that business will soon return to its normal.

Everywhere THE METAL INDUSTRY representative went he was greeted with new pasteboard card signs which read: "It's time to smile"; "keep smiling" and "made in U. S. A." posted in the various offices. And if we may judge anything from this, it is that there is a wave of optimism has swept over the local dealers minds. And as one dealer expressed his optimism; "I expect that spring will bring a large amount of business. It is only a question of getting the big firms started and the rest will fall in line. "In fact I know," he continued, "of one of the largest firms in this country which has enough orders on its books to keep its mills busy, running full capacity, day and night for two and one-half years. But for some reason they are holding up their plant."

"Metals are hard to get," another dealer said, "for some unknown reason, and I am under the impression that copper will be selling at 25 or 30 cents a pound by March first."

Another thing the local men are looking forward to is another big raise in the price of copper after end of the present European war. Local metal men say that every bit of copper in Europe is being converted into uses for warfare. One dealer went so far as to say that the people of Germany are melting their copper kettles and pots, the copper on locomotives, trolley and telegraph wires, etc., to be converted into shells. All of this according to his theory means a big boom in business and a raising of the price of copper after the war.

All of the foundries are picking up. There is a fair amount of increase over that of last month. The Unique Bronze Foundry booked another order from the Pierce Arrow people to do all the yellow brass work for 700 pleasure cars, and the Lumen Bearing Company got the manganese bronze work. These two firms have been unusually blessed with work, and as the manager of one of these firms said, "We have enough work to keep us busy until next summer without adding single order or the regular orders which we are booking each day."

The Schnell Bronze Bearing Company, Inc., have been granted permission to mortgage their plant for $5,000, for enlarging and altering their plant.

Local electroplaters are having a slight increase in business. And on a whole they are busier than they were a year ago last month. One firm has secured an unusually large order of galvanizing work which will keep it busy for some time to come.

A. G. Fries, president of the A. G. Fries Plating Company, is getting out a sample case of different finishes. The case will contain a variety of over 100 different kinds. A great majority of them have a very artistic tone and finish. The case will be of such construction when finished that it may be set up in the office for the benefit of trade, and also that it may be easily folded up and carried with ease when out seeing a prospective customer.

The rolling and finishing end of the metal business is also getting its due share of business.

The George Ray Manufacturing Company people are very busy, and as Mr. Ray said, "We can't get the metals fast enough to fill our orders."

Zero Valve and Bronze Company booked over $6,000 worth of orders during the last week of January, in addition to their regular run of orders. Another firm is said to have thrown down an order requiring 5,000 pounds of copper.

At a recent meeting of the State Board of Workmen's Compensation Commission, in Buffalo, Isaac Richardson, an employee of the Buffalo Copper and Brass Rolling Mill, was awarded $31.16 for a lacerated finger; Joseph Wullich, Republic Metalware Company, finger amputated, $51.93.—G. W. G.

TORONTO, ONTARIO, CANADA

FEBRUARY 8, 1915.

The English government has taken all the spelter and nickel to be found at all the factories and supply houses for making bullets. Tin is said to have gone up here 10 per cent., and in England 5 per cent. The Brittania metal trade has been affected, owing to the dearth of tin. There is a demand here for tin, spelter, nickel, platinum and various goods made of tin, brass, bronze and other lines. Gold is not any too plentiful, nor silver either. There are very few business lines that are doing any more than 33⅓ or 50 per cent. of the usual trade.

The British Aluminum Company having an office in this city and a plant in England, are doing their usual business in aluminum ingots, bars, sheets, mouldings, coils, conductors, tubing, etc.

The Imperial Brass Manufacturing Company, of Chicago, will build a plant at Redcliff, Alta., similar to the one at Chicago.

A. T. Eyten, of Nelson, B. C., has a new process for producing pure basic carbonate white lead, at a great saving of cost and time. He was formerly manager of the North Wales Smelting and Manufacturing Works.—H. S.

NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The Tiffin Art Metal Company, Tiffin, Ohio, are erecting a two-story fireproof building, 40 x 80 feet, which will be used for warehouse purposes.

J. L. Stafford has taken over the electro-plating business of the Robert A. Kennedy Company, 54 Page street, Providence, R. I., and will operate the business under the same name.

Construction work on the two additional stories to the factory of the Doehler Die Casting Company, Brooklyn, N. Y., is already in progress. The present building is a four-story structure, 45 x 100 feet, and the addition will add fifty per cent to the floor space.

The Central Illinois Sales Company, sales organizers and specialty distributors and also manufacturers of a patented auto-emergency lamp, 253 East Main street, Decatur, Ill., have started a brass foundry and will make a specialty of jobbing brass, copper, bronze and aluminum castings.

The Terry Steam Turbine Company, Hartford, Conn., have appointed Earl F. Scott as their representive for the State of Georgia, with offices at 702 Candler Building, Atlanta, Ga. The company also announces that their Pittsburgh office is now located at 1624 Oliver building.

It is reported that Lockwood, Greene & Co., 60 Federal street, Boston, Mass., are preparing plans for two one-story smelters, 75 x 300 feet and 50 x 300 feet, for the Nassau Smelting & Refining Works, Tottenville (S. I.), N. Y. The Nassau Works are non-committal on this report.

The firm name of the Jamestown Art Brass Manufacturing Company, designers and manufacturers of gas and electric chandeliers, 304 Winsor street, Jamestown, N. Y., has been changed to the W. E. Stormer & Co., and is now located at 21 West 18th street, Jamestown, N. Y.

The General Chemical Company, New York, N. Y., reports net profits in the year ended December 31 of $2,947,897, a decrease from the record of 1913 of $11,897. Reservations for insurance amounted to $90,000, and $2,019,350 was paid out in dividends. Depreciation and other charges absorbed $591,844, leaving a balance for the year of $246,780.

The City of Philadelphia, acting on the recommendation of the Franklin Institute, has awarded the John Scott Legacy medal and premium to Dr. Charles Edouard Guillaume, of Sevres, France, for his alloy invar. This alloy consists of 63.8 per cent. Fe and 36.2 per cent. Ni, and has a coefficient of linear expansion of only 0.0000004 per degree centigrade.

Notices were recently posted in the Ingersoll-Rand plant, at Easton, Pa., that the men will immediately begin to work full time, that is 5½ days a week. It is reported that the order that has brought about the full operation of the plant is for projectiles and shrapnel, which are to be delivered to Canada, whence they will be distributed among the allied nations.

The Buckeye Brass & Manufacturing Company, Cleveland, Ohio, report that they have taken a large order for bronze bearings for shipment to Canada and to be used in building field cars for the English army. Among the different departments operated by this company are a brass, bronze and aluminum foundry, brass machine shop, tool room, grinding room and plating and polishing department.

The Thomas Buchanan Company, Cincinnati, Ohio, whose place of business at 216 Elm street, was recently damaged by fire, desire to inform the trade that they are now located at 29 West Third street and are prepared to take care of any business placed in their hands. This concern makes a specialty of abrasives for polishing and grinding purposes and of Tri B Brand Sulphurette, which they claim is 25 per cent. stronger than commercial sulphuret, yet is sold at a low price.

The Maiwurm German Aluminum Company, manufacturers of aluminum kitchen utensils, Ashland, Ohio, will be known in the future as the German Aluminum Company. Paul Maiwurm will have charge of the mechanical end of the business, while Frank Wensinger will take charge of the business and office end. The company will be organized to the amount of $40,000 and will commence operation on the first of February. A plating and polishing department and aluminum foundry are among the different departments operated by this company.

Directors of the International Smokeless Powder and Chemical Company, Wilmington, Del., on January 29, voted to put the concern into liquidation. Stockholders will be asked to concur at a special meeting on March 9. The concern, which is controlled by the du Ponts, is capitalized at $9,000,000. It is said that the stock, which has a par value of $50, will be taken over by the du Pont interests at about $30. Col. E. G. Buckner, vice-president of the du Pont Powder Company, is president of the concern, which has a plant at Parlin, N. J.

At the annual meeting of the Falcon Bronze Company, brass founders, Youngstown, Ohio, held January 22, the following officers were elected: President and general manager, G. A. Doeright; vice-president, John Noll; secretary, Harvey Z. Kelly; treasurer, E. E. Miller; superintendent, R. H. Doeright. The directors of the company are the above officers, together with C. H. Kennedy. The business of this company up until last October exceeded that of the year previous, but since that date there has been a sharp decline in orders.

The Atlantic Screw Works, Inc., a new corporation at Hartford, Conn., has taken over the plant of Fred N. Tilton. Mr. Tilton has associated with himself several prominent business men, remaining as president and treasurer. The vice-president and general sales manager is A. W. Bowman; secretary, Morton F. Miner. The directors, with the above officers, are Charles D. Rice, Samuel M. Stone, Leon P. Broadhurst and S. S. Chamberlin. The company will continue the manufacture of wood screws of every description, including screws of brass and bronze.

After a business career of 66 years the Taunton Crucible Company, Taunton, Mass., has passed out of existence. At a meeting of the stockholders of the company held recently it was voted to close up the affairs of the concern and liquidate. The company has had a long and prosperous existence, its product being recognized as the best in its line, both in this country and abroad. But changing conditions, as well as present business conditions, made it advisable to terminate the long business life of the concern. The factory will be closed and the buildings and machinery offered for sale. It is probable that the manufacturing of crucibles may be resmued in event that the plant is sold.

The directors of the Electrolytic Art Metal Company, Trenton, N. J., having determined to retire from business, will sell as a going concern, their plant, machinery, equipment, finished and raw merchandise, good will, etc. The business can be bought with or without the buildings or the buildings will be leased. The factory is located in the midst of what might be termed the workmen's residential section of Trenton, at the corner of Beatty and Adeline streets. The main building is a three-story brick structure of substantial character, about 50 x 100 feet. It has direct lighting on four sides, and has been fitted up in full compliance with the factory laws of the State of New Jersey, including fire escapes, elevators, etc. In addition, there is a two-story out-building of about 25 x 30 feet, with concrete floor, which has been used as a stamping department.

The Enterprise Aluminum Company, Massillon, Ohio, recently incorporated to manufacture stamped aluminum cooking utensils, has established quarters in the galvanizing department of the Massillon Rolling Mill Company. The company will occupy quarters in the plant of the American Stamping & Enameling Company when that company's new

plant is completed. R. E. Bebb, president of the Enterprise Company, is also president of the Canton Stamping & Enameling Company, and the vice-president, M. L. Blackburn, is president of the American Stamping & Enameling Company, of Bellaire, Ohio. D. C. Celmer, who was formerly in charge of the stamping department in the Aluminum Cooking Utensile Company, New Kensington, Pa., will be in charge of the stamping department.

AMERICAN BRASS COMPANY STATEMENT

The annual meeting of the stockholders of the American Brass Company, was held at the office building, Waterbury, Conn., on February 2. The following statement showing the condition of business December 31, 1914, as compared with the same date in 1913, was submitted to the stockholders:

ASSETS.

	1913.	1914.
Real estate, machinery and tools, January 1	$11,533,087.68	$12,373,311.64
Expended for permanent imports during year	1,390,223.96	1,034,885.60
	$12,923,311.64	$13,408,197.24
Less charged off for depreciation	550,000.00	550,000.00
	$12,373,311.64	$12,858,197.24
Cash	1,181,392.45	2,017,501.15
Accounts receivable	2,784,766.83	2,545,601.52
Bills receivable	317,381.11	790,916.67
Woodlands	123,555.05	138,810.75
Stocks owned in other companies	1,631,178.72	1,644,250.03
Patents	1,000.00	1,000.00
Merchandise, raw, wrought and in process	6,481,866.05	6,624,904.84
	$24,894,451.85	$26,621,182.20

LIABILITIES

	1913.	1914.
Capital stock	$15,000,000.00	$15,000,000.00
Current accounts payable	845,247.36	2,021,630.69
Reserve for contingencies	1,000,000.00	1,000,000.00
Surplus	6,131,599.37	7,149,204.49
	$22,976,846.73	$25,170,835.18
Net earnings for year	1,917,605.12	1,450,347.02
	$24,894,451.85	$26,621,182.20
Surplus January 1	$7,181,599.37	$8,049,204.49
Less dividends paid	1,050,000.00	900,000.00
	$6,131,599.37	$7,149,204.49
Net earnings for year	1,917,605.12	1,450,347.02
Surplus December 31	$8,049,204.49	$8,599,551.51

CHANGE IN FIRM NAME

The Clarage Fan Company, of Kalamazoo, Mich., is the new name adopted by the Clarage Foundry & Manufacturing Company, who have built fans and shipped them to all parts of the United States and foreign countries for a number of years. The change of name has been made owing to the continued growth of the fan business and because the line has been developed until the company is in a position to take care of the requirements in any field, consequently it is thought that the new name is more indicative to the company's business.

FIRES

The factory of the Michigan Metal Products Company, Saginaw, Mich., was completely destroyed by fire on January 21 to an extent of $10,000, and which was covered by $6,500 insurance. The company reports that plans and specifications are out for a new building and that they are manufacturing goods in temporary quarters. The new factory is expected to be ready for occupancy by April 1.

A fire of unknown origin recently gutted the plant of the John A. Roebling Sons' Company, at Trenton, N. J., manufacturers of insulated wire. The loss, which is estimated to have been $1,500,000, was only partly covered by insurance, there being about $300,000 worth of insurance on the building. The building was 13 years old, and was equipped with the most up-to-date fire fighting apparatus. This made the fifth extensive fire to visit the Roebling plant. Charles G. Roebling, when asked as to whether or not he had any idea as to how the fire originated, replied that he was absolutely at a loss to account for the conflagration, as there were absolutely no combustibles in the building.

INCREASE OF CAPITAL STOCK

The Detroit Brass Works, Detroit, Mich., has increased its capital stock from $250,000 to $400,000.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Trade News" columns.

To deal in metal.—The Gotham Metal Works, 284 Seigel street, Brooklyn, N. Y. Capital, $25,000. Incorporators: Moses Tuscaro, Charles F. Frank and Frances Weinberg.

To manufacture brass goods.—Holland Art Brass Company, McKees Rocks, Pa. Capital $10,000. Incorporators: James F. Greene, N. R. Rosch and John F. Huhn.

To manufacture brass castings and similar goods.—The Canton Brass Foundry Company, Canton, Ohio. Capital, $20,000. Incorporators: Francis D. Held, F. W. Bond, C. B. McClintock, E. A. Sponsler and A. M. McCarty.

To manufacture brass, aluminum and other metal castings.—The Rath Aluminum & Brass Foundry Company, New Philadelphia, Ohio. Capital, $40,000. Incorporators: C. J. Rath and others.

To manufacture railroad journal bearings and general castings—National Brass Company, Houston, Tex. Capital $20,000 fully paid in. Incorporators: G. F. Cotter, president; J. W. Cain, vice-president and treasurer, and F. H. Littrell, secretary.

To manufacture die castings and die casting machinery—Acme Die Casting Corporation, Brooklyn, N. Y. Capital, $125,000. Incorporators: E. N. Dollin, Brooklyn, N. Y.; G. W. Bungay and E. N. Wolf, New York, N. Y.

FOREIGN TRADE OPPORTUNITIES

For addresses of these enquiries apply to Bureau of Foreign and Domestic Commerce, Washington, D. C., and give file number.

Lead, No. 15323.—An American consular officer in the Far East has transmitted the names and addresses of a number of exporters in his district who are in a position to quote prices and shipping arrangements for lead.

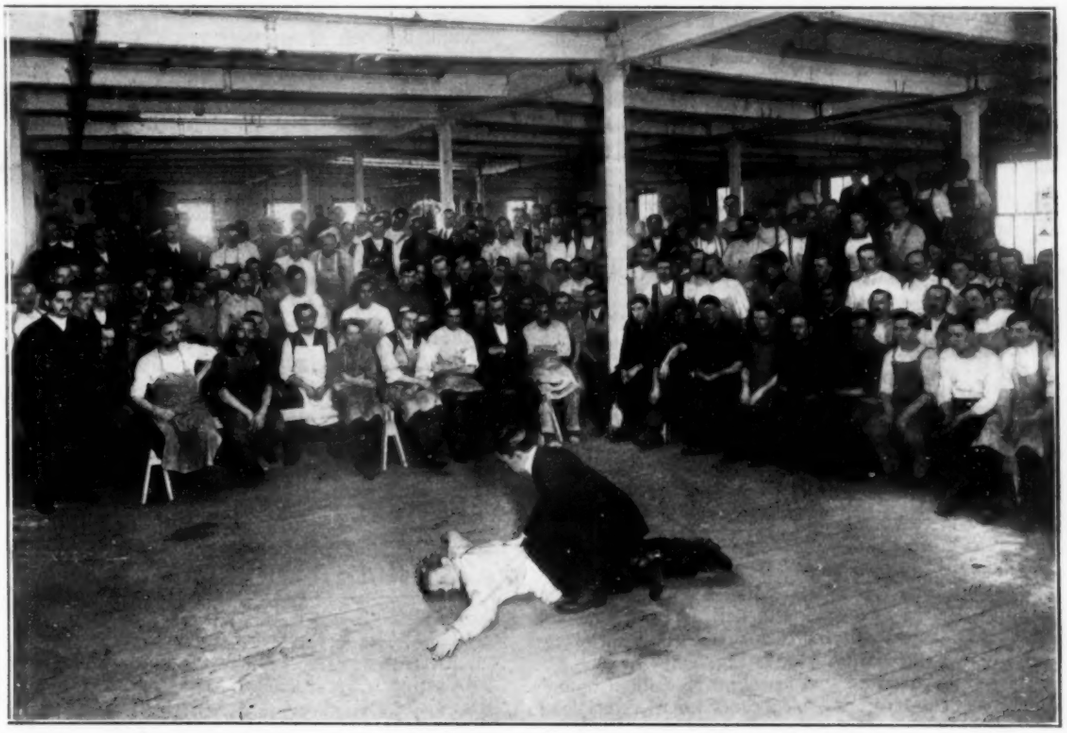
Lead and brass working machinery, No. 15408.—An American consular officer in Latin America reports that he is advised that a company is being organized in his district for the manufacture of lead and brass tubing and lead and brass plates and seals. A representative of the proposed company states that he wishes to receive catalogs from American manufacturers of machinery for this kind of work. It is stated

that cash will be paid for the machinery, which is needed immediately. Correspondence should be in Spanish.

Caustic soda, No. 15322.—A leading wholesale importer in a Latin-American country has informed an American consul that he desires to purchase, at once, 50 drums of 750 to 800 pounds each of caustic soda of 76 to 77 degrees purity. It is stated that this importer will buy all stock in future from the United States if exporters can meet European prices. Bids and samples may be submitted to his New York branch house. It is explained that this commodity has been purchased for about 2 cents per pound f. o. b. shipping point.

FIRST AID TO THE INJURED

The illustration below gives an idea of what the Auto-Pneumatic Action Company, New York, are doing to preserve the health and life of their employees. The picture was taken during a lecture given at one of the weekly meetings which are held between twelve and one, every Thursday, and which are attended by the factory hands as well as the executives of the company. This lecture was given by Dr. F. H. Wilson, who, in the course of his talk, reviewed what was to be done in case of fractures, injuries, gas suffocation, accidental poisoning, etc. He graphically demonstrated the method to pursue to resuscitate a workman overcome by gas. Such activities as referred to above show the new humanitarianism which is happily becoming more and more prevalent in manufacturing concerns and our cut emphasizes the interest and safeguards which the Auto-Pneumatic Action Company are taking in their employees and which other manufacturers would do well to follow.



A FIRST AID TO THE INJURED LECTURE AT THE AUTO-PNEUMATIC ACTION COMPANY'S PLANT, NEW YORK.

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

PRINTED MATTER

Phosphor Bronze and other alloys are interestingly treated in price list No. 27 recently issued by the Phosphor Bronze Smelting Company, Philadelphia, Pa. The products of this company include the Elephant Brand of phosphor bronze, phosphor copper and other phosphor anti-friction metals in all shapes, from wire to sheet.

Turbines.—The Terry Steam Turbine, Company, Hartford, Conn., have issued Bulletin 19, superseding Bulletin 9, devoted to centrifugal pumps and giving descriptions and illustrations of the Terry turbines for pump drive use. The bulletin contains sixty-four pages and describes all of the various types of Terry turbines now being manufactured.

Insulation.—The Armstrong Cork & Insulation Company, Pittsburgh, Pa., have issued a little booklet, "Permanent Fortifications," which gives descriptions and illustrations of the application of the four distinct types of insulation which have been evolved by this company and which are known as Nonpareil products. Chief among these products is the Nonpareil cork covering which has been described in The Metal Industry for September, 1914.

Ventilators.—The Arex Company, manufacturers of siphonage ventilators, Chicago, Ill., have issued a four-page folder giving elaborate descriptions and illustrations of their ventilator, which is operated on the siphonage principle and originated by J. C. Kernchen, the president of the company. This ventilator is guaranteed storm-proof, due to its unique construction, and it its claimed that down-drafts are impossible. Full information can be obtained by corresponding with the Arex Company.

Die Castings.—The American Die Casting Company, Inc., of New York, Brooklyn, N. Y., have issued a very interesting little catalog giving a number of illustrations and descriptions of the line of die-molded finished castings which they produce. This process of producing die molded finished castings is to compress under a great pressure molten metal into specially constructed steel dies. The line of castings produced in this way, illustrated in this catalog, is quite extensive and

is well worth the attention of any one who is interested in such finished castings. Copies of the catalog and also samples of the product will be furnished upon request.

"Anodes and Plating Salts" is the name of the latest bulletin issued by the Munning-Loeb Company, of Matawan, N. J. The bulletin not only presents their line of anodes and plating salts, but contains information on anode characteristics, efficiencies and effect of shape, that should be of special interest to platers and all users of anodes. The bulletin is well illustrated, showing interesting illustrations of stages of anode decomposition. The latter pages of the book contain a special discussion on single and double nickel salts. Copies will be sent anywhere upon request.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

METAL MARKET REVIEW

New York, February 8, 1915.

COPPER.

The copper market for the first month of 1915 has made a pretty good showing. Home buyers have come into the market and the export business has been very good. Prices have advanced from 1 cent to 1¼ cents per pound and producers seem to have the situation well in hand.

Statistically the market is in much better shape and stocks of marketable copper can fairly be estimated today at around 100 million pounds against a possible 150 million pounds at the end of 1914. It is to be remembered the refining output was reduced in August 50 per cent., and this action by the leading producers has, at last, had its effect on the copper market. Several of the smaller properties closed down entirely and the price sagged off from 12¾ cents in August to 11⅛ cents in October when a buying movement started and the price has been pushed to 14¾ cents today. With 14¾-cent copper it is more than probable that more copper will be produced and the price will be kept in a fairly legitimate range.

The Copper Producers' Association has been dissolved and no more monthly figures of stocks and deliveries will be published. This move seems to be more in favor of the producers than the consumers, and that probably is the "why" of it.

The exports for the month will be around 55 million pounds.

Market today is firm at around 14¾ cents for electrolytic, 15 cents for Lake, and 14½ cents for casting brands.

TIN.

The price of tin during the month has been advanced nearly 5 cents per pound. London speculators have taken hold of the market and despite the slow demand from America—the deliveries for the month were only 2,300 tons—the price of tin in London has been steadily advanced and today we are considerably below the London parity.

Prices today are around 38 cents for spot tin and from 2 cents to nearly 3 cents per pound lower for futures.

LEAD.

The lead trust reduced the price of lead $2 per ton January 12 to 3.70 New York basis, and on January 28 advanced it $2 back again to 3.80 cents per pound New York basis, where the market stands today. The independents have just followed the lead of the trust.

SPELTER.

The spelter market has been very active. In London the price has advanced over £10 per ton and the London equivalent today is around 8 cents per pound c. i. f. London. From about 5¾ cents per pound early in January to close to 8 cents today looks very like manipulation. There has been really nothing in the ordinary market development to warrant this advance. We called attention to the fact last month that the Government had not been able to publish the annual statistics because certain firms declined to give the Government any information. Some one in the trade suggested that because Russia wanted to buy spelter in this market it was but natural that the foreign firms who control the spelter market in this country should make the Russians pay the price. The market today looks as though it is being bolstered up and it may not be long before the bubble bursts. New York price, 7¾ to 8 cents per pound.

ALUMINUM.

Market very dull and prices about the same as a month ago. Ingots, 98 to 99 per cent., 18¾ to 19¼ cents per pound.

ANTIMONY.

The antimony market has been very active and prices have advanced about 4 cents per pound. Russia, after buying freely in China and Japan, came into this market, and it is predicted prices may go very much higher. Cookson's today is quotable at around 20 cents, with Hallett's at 18½ and Hungarian grade at 16½ cents.

SILVER.

The silver market has been very dull and prices have not fluctuated much. The official price today is around 48¾ cents New York and 22⅝ pence in London.

PLATINUM.

The demand for platinum has fallen off and the market today is more or less weak with prices inclined to be lower. Ordinary refined is around $42 to $43 per ounce, with 10 per cent. hard at $46 to $47.

QUICKSILVER.

The wholesale price of quicksilver is today $4 per flask higher than a month ago and is quoted at $54, with smaller lots at $56 to $57.

SHEET METALS.

Sheet copper and wire has followed the advance of the ingot market. Sheet copper is quoted at 19¾ base, copper wire at 15¾ cents, with high sheet brass at 15½ cents base.

OLD METALS.

The price of all copper and brass scrap has advanced more or less in sympathy with copper, but business has not been good. There always seem to be too many sellers for any business that comes.—J. J. A.

JANUARY MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
Copper:			
Lake	15.	13.10	14.00
Electrolytic	14.75	12.85	13.75
Casting	14.50	12.75	13.55
Tin	37	32.85	34.30
Lead	3.80	3.70	3.75
Spelter	8.00	5.75	6.56
Antimony (Hallett's)	18.50	14.50	16.50
Silver	49⅞	48½	48.90

WATERBURY AVERAGE

The average price of Lake Copper per pound as determined monthly at Waterbury, Conn.:

1913—Average for year, 15.83. 1914—Average for year, 13.91. 1915—January, 14⅛.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

Metal Prices, February 8, 1915

NEW METALS.	Price per lb. Cents.
COPPER—PIG AND INGOT AND OLD COPPER. Duty Free. Manufactured 5 per centum.	
Lake, carload lots, nominal	15
Electrolytic, carload lots	14¾
Castings, carload lots	14½
TIN—Duty Free.	
Straits of Malacca, carload lots	37¼
LEAD—Duty Pig, Bars and Old, 25%; pipe and sheets, 20%. Pig lead, carload lots	3.80
SPELTER—Duty 15%. Sheets, 15%.	
Western, carload lots	8.00
ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.	
Small lots, f. o. b. factory	24.00
100 lb. lots, f. o. b. factory	21.00
Ton lots, f. o. b. factory	19.00
ANTIMONY—Duty free.	
Cookson's cask lots, nominal	20.00
Hallett's cask lots	18.50
Hungarian grade	16.50
NICKEL—Duty Ingot, 10%. Sheet, strip and wire 20% ad. valorem.	
Shot, Plaquettes, Ingots. Blocks according to quantity	.38 to .43
ELECTROLYTIC—3 cents per pound extra.	
MANGANESE METAL	nominal
MAGNESIUM METAL—Duty 25% ad valorem (100 lb. lots)	nominal
BISMUTH—Duty free	2.25
CADMIUM—Duty free	1.85
CHROMIUM METAL—Duty free	.75
COBALT—97% pure	2.00
QUICKSILVER—Duty 10%, per flask	$58.00 to $60.00
	Price per oz.
GOLD—Duty free	$20.67
PLATINUM—Duty free	38.00
SILVER—Government assay bars—Duty free	48⅛c.

INGOT METALS.	Price per lb. Cents.
Silicon Copper, 10% ..... according to quantity	25 to 28
Silicon Copper, 20% ..... " "	28 to 32
Silicon Copper, 30% guaranteed " "	30 to 34
Phosphor Copper, guaranteed 15% "	23 to 27
Phosphor Copper, guaranteed 10% "	18 to 22
Manganese Copper, 30% ..... " "	22 to 26
Phosphor Tin, guaranteed 5%. " "	57 to 60
Phosphor Tin, no guarantee... " "	42 to 45
Brass Ingot, Yellow ..... " "	11 to 12
Brass Ingot, Red ..... " "	12 to 12½
Bronze Ingot ..... " "	13½ to 14¼
Manganese Bronze Ingots..... " "	17 to 18½
Phosphor Bronze ..... " "	18 to 19½
Casting Aluminum Alloys..... " "	16 to 18

PHOSPHORUS—Duty free.	
According to quantity	30 to 35

Dealers' Buying Prices. Cents per lb.	OLD METALS.	Dealers' Selling Prices. Cents per lb.
11.75 to 12.25	Heavy Cut Copper	13.25 to 13.50
11.50 to 11.75	Copper Wire	13.00 to 13.25
10.50 to 10.75	Light Copper	12.00 to 12.25
10.25 to 10.50	Heavy Mach. Comp	11.50 to 11.75
8.25 to 8.50	Heavy Brass	9.50 to 9.75
6.25 to 6.50	Light Brass	7.25 to 7.50
7.75 to 8.00	No. 1 Yellow Brass Turnings	8.50 to 9.00
9.00 to 9.25	No. 1 Comp, Turnings	9.75 to 10.25
3.30 to ——	Heavy Lead	—— to 3.50
5.50 to ——	Zinc Scrap	—— to 6.00
5.50 to 6.50	Scrap Aluminum Turnings	6.00 to 7.00
11.50 to 12.00	Scrap Aluminum, cast alloyed	12.00 to 13.00
13.00 to 14.00	Scrap Aluminum, sheet (new)	13.00 to 14.00
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
17.00 to 23.00	Old Nickel	17.00 to 23.00

PRICES OF SHEET COPPER.

BASE PRICE, 19¾ Cents per Lb. Net.

Width.	LENGTH.	64 oz. and over.	32 oz. to 64 oz.	24 oz. up to 32 oz.	16 oz. up to 24 oz.	15 oz.	14 oz.	13 oz.	12 oz.	11 oz.
		Extras in Cents per Pound for Sizes and Weights Other than Base.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	½	1	1½	2	2½
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	½	1	2	3	4½
	Longer than 96 inches. Not longer than 120 inches.	"	"	½	1	2	3	5	7	
	Longer than 120 ins.	"	"	1	1½					
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	Base	Base	1	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	2	4	6	8
	Longer than 96 inches. Not longer than 120 inches.	"	"	1	2	3	4			
	Longer than 120 inches.	"	1	2	3					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	Base	1	2	3	4	6	8	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	4	5	7	9	
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	6	9			
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	5	7	9	11	
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	7	10			
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins., but not wider than 120 ins.	Not longer than 120 inches.	4	6							

The longest dimension in any sheet shall be considered at its length.

CIRCLES, 8 IN. DIAMETER AND LARGER, SEGMENTS AND PATTERN SHEETS, advance per pound over prices of Sheet Copper required to cut them from ..... 3c.

CIRCLES LESS THAN 8 IN. DIAMETER, advance per pound over prices of Sheet Copper required to cut them from ..... 5c.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot and heavier, advance per pound over foregoing prices ..... 1c.

COLD OR HARD ROLLED COPPER, lighter than 14 oz. per square foot, advance per pound over foregoing prices ..... 2c.

COLD ROLLED ANNEALED COPPER, the same price as Cold Rolled Copper.

ALL POLISHED COPPER, 20 in. wide and under, advance per square foot over the price of Cold Rolled Copper ..... 1c.

ALL POLISHED COPPER, over 20 in. wide, advance per square foot over the price of Cold Rolled Copper ..... 2c.

For Polishing both sides, double the above price.

The Polishing extra for Circles and Segments to be charged on the full size of the sheet from which they are cut.

COLD ROLLED COPPER, prepared suitable for polishing, same prices and extras as Polished Copper.

ALL PLANISHED COPPER, advance per square foot over the prices for Polished Copper. ..... 1c.

ZINC— Duty, sheet, 15%.

	Cents per lb.
Carload lots, standard sizes and gauges, at mill ..... 11.00 basis, less 8%	
Open casks, jobbers' prices	11½c.
Casks, jobbers' prices	12c.

Metal Prices, February 8, 1915

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect January 28, 1915, and until further notice.

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.15½	$0.17	$0.18
Wire	.15¼	.17	.18
Rod	.15¼	.17¾	.19
Brazed tubing	.19¼	——	.22¼
Open seam tubing	.19¼	——	.22¼
Angles and channels, plain	.19¼	——	.22¼

50% discount from all extras as shown in Brass Manufacturers' Price List.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass	½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire—Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

To customers who buy 5,000 lbs. or less per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.16¾	$0.18¼	$0.19¼
Wire	.16½	.18¼	.19¼
Rod	.16½	.19	.20¼
Brazed tubing	.20½	——	.23½
Open seam tubing	.20½	——	.23½
Angles and channels, plain	.20½	——	.23½

Net extra as shown in Brass Manufacturers' Price List.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass	½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire —Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

BARE COPPER WIRE—CARLOAD LOTS.

15¾c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	19c. per lb. base
100 lbs. to 300 lbs. in one order	19½c. " " "
Less than 100 lbs. in one order	21c. " " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ O. D. Nos. 4 to 13 Stubs' Gauge, 17½c. per lb.
Seamless Copper Tubing, 21½c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe sizes with price per pound.

⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
25½	24½	19½	18½	17½	17½	17½	17½	17½	17½	17½	18½	19½	21½	23½	24½

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1½ inch	25	27
1¾ inch	32	35
1⅞ inch	45	48
2 inch	56	60

Discount, 50%.

PRICE FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Red	19½c.	net base
Munts or Yellow Metal Sheathing (14" x 48")	15½c.	" "
" " " " Rectangular sheets other than Sheathing	18c.	" "
" " " " Rod	15½c.	" "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 24½c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Sheet Block Tin—18" wide or less. No. 26 B. & S. Gauge or thicker. 100 lbs. or more 5c. over Pig Tin. 50 to 100 lbs. 6c. over, 25 to 50 lbs. 8c. over, less than 25 lbs. 10c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 4c. over Pig Tin. 50 to 100 lbs. 5c. over, 25 to 50 lbs. 7c. over, less 25 lbs. 9c. over.

Above prices f. o. b. mill.

Prices on wider or thinner metal on request.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Gauge.	Width. Inches.	1 ton.	50 to 2,000 lbs.	Less than 50 lbs.
20 and heavier	3-30	25.9	26c.	29c.
	3-30	26.9	27c.	30c.
21 to 24 inclusive	30-48	28.9	29c.	32c.
	48-60	31.9	32c.	35c.
25 to 26	3-30	27.9	28c.	31c.
	30-48	29.9	30c.	33c.
27	3-30	28.9	29c.	32c.
	30-48	31.9	32c.	35c.
28	3-30	29.9	30c.	33c.
	30-48	32.9	33c.	36c.
29	3-30	30.9	31c.	34c.
	30-48	34.9	35c.	38c.
30	3-30	31.9	32c.	35c.

The above prices refer to lengths between 2 and 8 feet. Prices furnished manufacturers for wider and narrower sheet. No charge for boxing. F. O. B. Mill.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 22 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 in.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	26	23	..	..	13	11	9	8	15	22
12.	.109.	..	..	..	..	..	..	..	25	..	..	..	14	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	16	..	..	..	..	..
16.	.065.	..	..	..	..	..	27	26	26	23	22	20	20	20	20	26	30	56
18.	.049.	..	..	..	..	32	29	28	27	24	25	25	25	..	..	..	..	..
20.	.035.	116	..	45	38	33	32	31	29	28	29	29	29	30	37	48	57	80
21.	.032.	..	..	..	39	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	137	97	47	41	37	36	34	33	..	..	44	..	..	..	..	..	..
24.	.022.	187	132	107	87	78	72	61	59	65	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Price per lb. over 25 lbs., Diameter, B. & S. Gauge, No. 000 to 10 and 12, 26 cents. No. 12 to 20 inch, 28 cents.

BASE PRICE GRADE "B" GERMAN SILVER SHEET METAL.

Quality.	Net per lb.	Quality.	Net per lb.
5%	18¼c.	16%	22¾c.
8%	20c.	18%	23¼c.
10%	20½c.	20%	25½c.
12%	21½c.	25%	33¾c.
15%	22½c.	30%	39¾c.

GERMAN SILVER WIRE.

Quality.	Net per lb.	Quality.	Net per lb.
5%	19¼c.	15%	26½c.
8%	21c.	16%	27½c.
10%	22½c.	18%	29¼c.
12%	24½c.	30%	45¾c.

The above Base Prices are subject to additions for extras as per lists printed in Brass Manufacturers' Price List and from such extras 50% discount will be allowed. The above base prices and discounts are named only to wholesale buyers who purchase in good quantities. Prices on small lots are considerably higher.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 1c. below to 4c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2½c. to 3½c. above the price of bullion.